HORTICULTURAL ABSTRACTS

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Initialled abstracts and reviews are by E. Chroboczek of the Institute of Vegetable Crops, Skiernewice, Poland, F. H. Hooper of Messrs. H. W. Carter & Co. Ltd., The Old Refinery, Bristol, A. M. Massee of the East Malling Research Station, and G. St. Clair Feilden.

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N.B.—Numbers sub-divided alphabetically refer to items noted but not abstracted.

MISCELLANEOUS.

General.

113. WATSON, J. A. S. 63(42)
'How' the N.A.A.S. will work.
Agriculture, 1946, **53**: 375-80.

ery brief notes are followed by a list of the Provincial irectors and their Deputies in the 8 Provinces of the ational Agricultural Advisory Service for England and ales. Incidentally a list of the County Advisory Officers given *ibid.*, 1947, 53: 565-6.

114. TAYLOR, H. V. 634/635(42)
Horticulture in the N.A.A.S.
Agriculture, 1947, **53**: 519-22.

brief sketch is given of how it is hoped the system will ork when sufficient specialists are available, with notes the functions of the District Officer, the County Horti- ltural Officer and the Advisory Specialist. While the unty Horticultural Officer will act as the responsible ficer to the County Horticulture Sub-Committee and will lp in co-ordinating the horticultural work of the District ficers, the Advisory Specialists will establish and maintain se working arrangements with the appropriate research tion and in collaboration with it will be responsible r extended experimental work done in the Province. ey should be quick in encouraging the application of omising research results to commercial practice.

e author notes that a station for vegetable research is an mediate proposition and that at an appropriate time a tion for flowers, bulbs, flowering and decorative trees d shrubs is contemplated. It has further been agreed at a number of experimental horticultural stations should set up in different parts of the country, e.g. one each for e North, the Midlands, East Anglia, Southern Counties, d the West of England. In addition there will be some ovision for Wales and a station for the National Fruit ials. All these stations will come within the sphere of and be staffed by the National Agricultural Advisory Service.

1115. ASLIB. 02(062)
Aslib, What it is and what it does.
Association of Special Libraries and Information Bureaux, 52 Bloomsbury Street, London, S.W.1. 1946, pp. 20.

A pamphlet describing Aslib and setting out its services to scientists and technologists; Aslib is well equipped to direct the seeker after knowledge to the most likely sources of the information he needs. A note is given of the facilities for documentary reproduction and present charges.

1116. NEWNHAM, E. V. [DUVDEVANI, S.]. 551.574(569)
Dew in Palestine.
Nature, 1947, **159**: 515.

This is a brief account of the very simple optical method of measuring dew, developed by Duvdevani at the Dew Research Station, Pardess Hanna Agricultural School, Karkur, Palestine. The dew gauge, a standard wooden block, is exposed in the open at a standard height from sunset to sunrise. Dew is estimated by reference to a standard atlas of photographs, with which the size, form and distribution of the drops on the gauge are compared. From the Quarterly Dew Statement it is obvious that in the Rift [Jordan] Valley crops get very little assistance from dew between April and June, whereas the coastal and hill country benefit from dew on a scale unknown in England.

1117. NOORDAM, D., Jr., AND VAN DER VAART-DE VLIEGER, S. H. 631.46
Het onderzoek naar de bodemfauna. (An investigation of the soil fauna.)
Meded. Inst. toegep. biol. Onderz. Natuur, **2**, 1942 [or later ?], 24 pp., bibl. 22.

The fauna of leaves fallen during one autumn-period was studied throughout the year until the next autumn leaf-fall. The methods are described and the data obtained tabulated.

1118. EMME, A. M. 581.036.5
On the stimulative action of low temperatures. [Russian.]
Adv. mod. Biol., 1947, **23**: 127-40, bibl. 90.
A review of the literature on the subject with special regard to animal cells and tissues, but reference is also made to the effect of low temperatures on cereals (vernalization), potato, pear, cherry and tomato.

Technique.

1119. STOUGHTON, R. H. 631.589: 663.61
Methods for the direct nutrition of plants.
Chem. Industr., 1946, No. 48, pp. 427-9, bibl. 16
In his paper given before the Agriculture Group on 22 January, 1946, the author considers 3 uncommon methods of feeding plants, namely (1) direct injection, (2) spraying the leaves, and (3) soilless cultivation. Most of the paper is devoted to the possibilities opened up by soilless cultivation methods, which consist of growing the plants either in a culture solution or in sand to which solutions of known strength and content are added. Summing up the advantages of soilless cultivation he writes, "It would appear that the primary advantage lies in economy of labour. Such labour-consuming operations as winter-digging, steam sterilization, cultivation during the growing period, fertilizer distribution and watering are either avoided or made automatic. Greatly enhanced yields are not to be expected in comparison with the best results in soil, but higher average yields may be looked for in view of the greater uniformity of the plants. Other advantages which may be looked for are greater freedom from soil-borne pests and diseases, better quality of produce, and the possibility of some control over the nutritional value in the case of food crops, all arising from what is, after all, the chief object of all these different systems, the greater degree of control over the nutrition of the plant." He does not deal with the economics of such a system.

1120. STOUGHTON, R. H. 631.589: 663.61
Nutrient solution culture of crop plants.
Agriculture, 1947, **53**: 539-47, bibl. 22.
The author considers that in this country nutrient solution methods of cultivation are likely to be applicable on a commercial scale only to the high value crops of the grower under glass, and the system will stand or fall mainly according to the degree to which it reduces labour costs. After briefly noting Gericke's "hydroponic" system he compares in detail the sand culture and sub-irrigation methods used at Reading. Results with tomatoes were in both cases extremely encouraging. Trials on similar lines at Swanley have so far been inconclusive. Attention is called to the very interesting work at Jealott's Hill on the sand culture system and various modifications thereof, and special mention is made of the development there of a system of automatic surface watering. Attention is also drawn to work on carnations and a variety of flower crops such as zinnias, tobacco plants, gladioli and, this year, sweet peas. The author is cautiously optimistic as to future developments. In an appendix he gives a guide to the preparation of nutrient solutions.

1121. ARNON, D. I., AND GROSSENBACHER, K. A. 631.8: 578.08
Nutrient culture of crops with the use of synthetic ion-exchange materials.
Soil Sci., 1947, **63**: 159-80, bibl. 10.
An attempt was made to grow tomato and lettuce plants in sand cultures in which the plant nutrients were applied, not in solution, but as adsorbed cations and anions on synthetic resins, known as Amberlites. Two principal nutrient combinations were investigated: (*a*) one in which all the nutrient ions were furnished in an adsorbed form on Amberlites, and (*b*) another in which potassium and nitrogen were supplied by daily irrigations of a dilute KNO_3 solution but all the other nutrients were furnished as in (*a*). In treatment (*a*) calcium and magnesium were found unavailable for plant growth. Good growth and fruiting were obtained n (*b*).

1122. GROSSENBACHER, K. A. 631.8: 578.08
Comments on the basis of "contact effect".
Soil Sci., 1947, **63**: 180-2.
The contact-exchange theory of Jenny and Overstreet postulates a direct transfer of adsorbed cations between plant roots and clay particles. Contact effect is discussed in relation to the results obtained in the experiment mentioned in the article by Arnon and Grossenbacher noted above (abstract 1121). The conclusion is drawn that contact effects played an important role in that investigation. The number of contacts and the charge on the particles were both involved. A critical electrolyte level probably associated with the particle charge is indicated. In the range of 0·01-0·03 *M* concentration there is less adverse effect than in lower concentrations.

1123. RIGNEY, J. A. 519: 634/635
Some statistical problems confronting horticultural investigators.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 351-8, bibl. 3.
A discussion of choice of treatment, sampling techniques and experimental designs in horticulture.

1124. TURRELL, F. M., AND VANSELOW, A. P. 531.72: 634.1/7
Tables of coefficients for estimating oblate and prolate spheroidal surfaces and volumes from spherical surfaces and volumes. For finding fruit surfaces and volumes.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 326-36, bibl. 26.
Tables of coefficients are presented for rapidly finding the surfaces and volumes of oblate and prolate spheroids, which fruit often resemble in shape. The methods of deriving and using the coefficients for finding fruit surfaces and volumes are discussed, and examples are given. A critical discussion of the errors involved in using the spheroidal coefficients in estimating fruit surfaces is included. [Authors' summary.]—Riverside, Calif.

1125. BROWN, J. G., AND LILLELAND, O. 635.243
Rapid determination of potassium and sodium in plant materials and soil extracts by flame photometry.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 341-6, bibl. 4.
The authors used a Flame Photometer made by the Perkin Elmer Corporation Glenbrook Conn., on the model of that described by Barnes *et al.* in *Industr. Engng Chem., Anal. Edit.*, 1945, 17: 605. The method is said to have the advantages of speed, low cost of reagents, ease of operation and reasonable accuracy. It is briefly described.

1126. LA COUR, L. F. 576.6
Improvements in plant cytological technique. II.
Bot. Rev., 1947, **13**: 216-40, bibl. 76.
Supplement to article in *Bot. Rev.*, 1937, 3: 241-58 (*H.A.* 9: 378). The author deals chiefly with smears and squashes and discusses improvements in other methods.

1127. WHITE, P. R. 578.08: 581.14
Plant tissue cultures. II.
Bot. Rev., 1946, **12**: 521-29, bibl. 93.
A supplement to an earlier article (*Bot. Rev.*, 1936, 2: 419-37). Work on plant tissue cultures since 1936, especially to cover in detail the years 1942, 1943 and 1944, is reviewed in 5 pages with nearly 4 pages of references.

128. Potockaja, A. P. 635.34: 535.6
A chemical method of detecting mitogenetic radiation. [Russian.]
Adv. mod. Biol., 1946, **22**: 295-9.
xpressed sap of red cabbage when irradiated with mito-enetic rays undergoes a change of colour indicating a owering of the pH, which can be confirmed electrometri-ally. Similar experiments with the sap of white cabbage lso produced a change in the acid direction. In an attempt o simplify the method the author used ascorbic acid (a onstituent of cabbage juice) as an indicator for mitogenetic adiation and later found that a number of acids and lkaloids can also be used as indicators. Results, tabulated, ow the change in pH of various chemical solutions after radiation. A routine method, using ascorbic acid for he detection of mitogenetic rays, is described.

129. Kraus, E. B., and Squires, P. 551.577
Experiments on the stimulation of clouds to produce rain.
Nature, 1947, **159**: 489-91, bibl. 3.
report on experiments, carried out by the C.S.I.R. ustralia, involving the dropping of granulated carbon ioxide from an aeroplane into a cloud. They were not ithout promise.

130. Wilcox, J. C. 631.588.1: 631.423
Determination of electrical conductivity of soil solution.
Soil Sci., 1947, **63**: 107-17, bibl. 17.
he electrical conductivity (mhos $\times 10^6$) and the actual salt ontent were determined on a number of solutions varying idely in salt content. A relationship close enough to arrant the use of the resistance meter for routine work was ound to exist between the two measurements. The rocedure involved wetting the soil to about five times the oisture-holding capacity, stirring, letting stand 20 to hours, stirring again, letting settle 1 hour, and taking an ectrical resistance reading on the supernatant liquid ithout filtering. The results are expressed in terms of hos $\times 10^5$ at 25° C. [From author's summary.]

131. Bouyoucos, G. J. 631.436
A new electrical resistance thermometer for soils.
Soil Sci., 1947, **63**: 291-8.
etails are given concerning the design, construction and haracteristics of an electrical resistance thermometer, mple, convenient and reliable, for measuring soil tempera-ires at various depths under field conditions. It is of two pes. Type 1 measures temperatures from about − 20° to out 100° F. Type 2 measures temperatures from about 2° to about 135° F.

132. Bobko, E. V., and Stankov, N. Z. (Editors). 631.48
The application of micro-fertilizers. [Russian.]
Publ. Lenin Acad. agric. Sci. U.S.S.R., 1940, pp. 16 [received 1947].
he brochure consists of summaries of papers read at a onference held in September 1939. They include notes n the application of boron, radio-active elements, and opper (on boggy soils).

Physiology and chemistry.

133. Blackman, G. E., and Rutter, A. J. 614.014.44: 585.722
Physiological and ecological studies in the analysis of plant environment. I. The light factor and the distribution of the bluebell (*Scilla non-scripta*) in woodland communities. II. The interaction between light intensity and mineral nutrient supply in the growth and development of the bluebell (*Scilla non-scripta*).
Ann. Bot. Lond., 1946, **10**: 361-90, bibl. 12, and 1947, **11**: 125-58, bibl. 21.
Shading below half-daylight depresses growth; mineral nutrition in woodlands is probably adequate for the bluebell.

1134. Kasarjan, V. O. 612.014.44
Photoperiodic reaction in plants as affected by quality of light.
C.R. Acad. Sci. U.R.S.S., 1946, **54**: 77-80.
Experiments with *Perilla nankinesis*, *Ricinus communis* and mustard (*Sinapis alba*) led to the following conclusions: All the rays of the visible portion of the spectrum produce some effect upon the photoperiodic reaction of the plants; the activity of the long-wave rays (especially the red ones) is very high in comparison with that of the short-wave rays (green and blue). Natural light produces a stronger effect upon the reproductive development of plants than coloured rays of the visible spectrum of equal intensity. The green rays are more active photoperiodically than the blue ones. This fact is undoubtedly evidence in favour of the view that the photoperiodic reaction is not only a result of the physiological activity of the chlorophyll, but that other pigments absorbing green rays are in a measure participating in this process.

1135. Čaĭlahjan, M. H. 612.014.44
Photoperiodic response of plants with their individual leaves submitted to different daylengths.
C.R. Acad. Sci. U.R.S.S., 1946, **54**: 735-8.
Experiments were carried out on a short-day plant, *Perilla nankinensis*, and the long-day plants, white mustard (*Sinapis alba*), spinach, radish and *Rudbeckia bicolor*. The difference between the photoperiodic reaction of long-day and short-day plants is that, with some of their leaves placed in favourable photoperiods, the inhibitory action of the short-day leaves in long-day plants is much less when compared with that of the long-day leaves in short-day plants.

1136. Čaĭlahjan, M. H. 612.014.44: 581.14
Influence of leaves exposed to different daylength upon development of shoots.
C.R. Acad. Sci. U.R.S.S., 1946, **54**: 837-40.
Experiments were carried out on red-leaved perilla (*Perilla nankinensis*) and white mustards (*Sinapis alba*). Sections of stems, with leaves that had been kept under conditions either of short or of long day, were partly split off, so as to separate the long-day leaf from the short-day leaf. The experiment showed that in the case of a deep longitudinal incision of the stem the leaves produce the same effect as without the operation, irrespective of the relative position of the long-day and the short-day leaves. The suggestion that in such cases there is an impassable barrier, preventing the transmission to the stem bud of the influence of the leaves placed in optimal photoperiods, is untenable.

1137. Okunzov, M. M. 581.192: 546.56
Effect of copper upon chlorophyll content in plants.
C.R. Acad. Sci. U.R.S.S., 1946, **54**: 641-3.
Copper was introduced into plants by spraying them with copper sulphate solution (0·0001 *M*) and its introduction into the turf in which the plants were grown, turf being used as containing less copper than ordinary soils. Chlorophyll content was measured with a spectrophotometer. The results show that the sprayed plants contained more chlorophyll than the controls. The increase in sugar beet was 11·4%, in sunflower 16·7%, in black currant 20·3%, and in maize 60·6%.

1138. Okunzov, M. M. 546.56: 581.12
Effect of copper upon photosynthesis and respiration of plants.
C.R. Acad. Sci. U.R.S.S., 1946, **54**: 733-4.
Plants were sprayed with 0·0001 *M* copper sulphate five times from 28 June to 14 July. The treatment had no effect on the intensity of photosynthesis. Respiration, however,

was modified and varied with the plant species; treatment caused a decrease in potato, sunflower and sugar beet, and an increase in maize.

1139. Okunzov, M. M. 546.56: 581.192
Influence of copper upon the state of chlorophyll and the ageing of plants.
C.R. Acad. Sci. U.R.S.S., 1946, **54**: 829-32.
In potato leaves chlorophyll undergoes decomposition. In leaves sprayed with 0·0001 *M* copper sulphate solution the chlorophyll content is found to increase as compared with that in control leaves. Copper prevents the decomposition of the chlorophyll and stabilizes its content in the plant tissues. The increase of chlorophyll in the sprayed leaves is due to the rate of breakdown of chlorophyll being reduced by the stabilizing influence of copper. By stabilizing the content of chlorophyll the copper retards the physiological ageing of the plastids and causes increased longevity of the leaf.

1140. Stiles, W., and Dent, K. W. 581.12
Researches on plant respiration. VI. The respiration in air and in nitrogen of thin slices of storage tissues.
Ann. Bot. Lond., 1947, **11**: 1-34, bibl. 31.
Materials: artichoke, potato, beetroot, mangold and carrot. Some time after cutting, thin slices begin to respire more rapidly in air than do intact organs; it is concluded that respiration in the middle of the organ is limited by the low concentration there of oxygen, which would appear, therefore, to be necessary, in order to activate either the substrate or the enzyme system. In nitrogen slices respire as do whole organs. All tissues examined gave evidence of oxidative anabolism.

1141. Sutulov, A. N. 581.192: 631.811.91
Changes in the carbohydrate metabolism in plants as an indicator of their water supply. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1946, No. 11-12, pp. 31-4.
From his observations on potatoes the author concludes that the relation saccharose-monoses is a character that quickly responds to the internal changes of the cells when affected by unfavourable conditions of temperature and water supply. This relation may thus be of use as an indicator of the need of the plant for water, and for limiting irrigation. Uniform increase in the value of this relation indicates an increasing deficit of moisture, with the associated symptoms, e.g. the interruption in the synthesis of polysaccharides, the decrease and even inhibition of photosynthesis, saccharification, increase in osmotic pressure, arrested growth, etc. With greater stress of unfavourable factors there arise products of anaerobic metabolism, e.g. ethyl alcohol. The protracted influence of such conditions may result in irreversible changes, leading to death.

1142. Kursanov, A. L. 577.15
Adsorption of enzymes by tissues of higher plants. [Russian, English summary ½ p.]
Biohimija, 1946, **11**: 333-48, bibl. 10.
The tissues of higher plants are able to adsorb enzymes (invertase, glucosidase and amylase) from solutions, but only by living cells. The process is very rapid at first and gradually slows down as the saturation limit is approached; it is selective and certain substances may be adsorbed while others are not. When enzymes are so adsorbed they lose their hydrolytic activity which is regained on desorption. It is therefore concluded that such adsorption plays an important role in regulating enzymatic processes in the living cell. The results, tabulated, include data obtained from certain vegetables and from sugar beet.

1143. Sisakjan, N. M., Kobjakova, A. M., and Vasiljeva, N. A. 581.131
Influence of the osmotic concentration on the adsorption and elution of invertase in tissues of high plants. [Russian, English summary ½ p.]
Biohimija, 1947, **12**: 7-19, bibl. 19.
Data are tabulated for leaves and leaf stalks of cyclamen and sugar beet. The connexion between the adsorption of invertase and synthesis of saccharose is indirect. If invertaes is adsorbed it loses its hydrolytic activity and this causes a shift towards the formation of saccharose. Under osmotic action the invertase of resting tissues easily goes into solution. The same osmotic concentration in resting roots causes elusion, in growing roots strong adsorption.

1144. Bradfield, J. R. G. 581.192
Plant carbonic anhydrase.
Nature, 1947, **159**: 467-8, bibl. 4.
Activity tests carried out on aqueous extracts have revealed a widespread occurrence of carbonic anhydrase in the leaves of flowering plants, including, for example, all cultivated brassicas, wallflower, cucumber, spinach, grapefruit, peach, tomato, etc. The three last-mentioned species are subject to zinc deficiency diseases. If, like animal carbonic anhydrase, the plant enzyme is shown to contain zinc, it would be interesting to examine the anhydrase content of zinc-deficient plants.—Department of Zoology, Cambridge.

*Growth substances.**

1145. van Stuivenberg, J. H. M. 577.17
Enkele recente toepassingen van plantengroeistoffen en verdere perspectieven. **(Further aspects of recent uses of plant growth substances.)**
Reprint from *Landbouwk. Tijdschr.*, 1946, pp. 513-52, bibl. 53, as *Overdr. Inst. Onderz. Verw. Fruit Groenten, Wageningen* **5**.
A review of the use of growth substances for (1) producing parthenocarpy (holly, strawberry, tomato, apple, pear, cherry, etc.); (2) controlling pre-harvest drop in apples and pears; (3) influencing the ripening of fruit (*a*) on the tree, (*b*) in store; (4) storage of potatoes; (5) storing onions; (6) retarding flowering in fruit trees; (7) hastening and retarding the flowering period of cut flowers.

1146. Maximov, N. A. 577.17
Growth substances, the nature of their activity, and their application to practice. [Russian.]
Adv. mod. Biol., 1946, **22**: 161-80, bibl. 43.
A general review of growth substances in their relation to plant development, discussed under the headings: (1) Introduction; a historical survey of the discovery of plant hormones and theories of their action. (2) Their influence on the entrance of water into the cell. (3) Their influence on the entrance of water-soluble substances into the cell. (4) The connexion between chemical structure and the physiological effect of growth substances. (5) The physiological foundations of the practical application of growth substances.

1147. Synerholm, M. E., and Zimmerman, P. W. 577.17
Preparation of a series of ω-(2,4-dichlorophenoxy)aliphatic acids and some related compounds with a consideration of their biochemical role as plant-growth regulators.
Contr. Boyce Thompson Inst., 1947, **14**: 369-81, bibl. 12.
Homologous series of ω-(2,4-dichlorophenoxy)aliphatic acids and their amides have been prepared and their physiological effects on growing tomato plants studied. Only

* See also 1183, 1208, 1214, 1225-1228, 1262, 1263, 1270, 1307, 1360, 1421, 1518, 1541, 1542, 1568.

ose members (acids or amides) which possess an even mber of carbon atoms in the aliphatic acid portions of eir molecules are active as growth regulators. About) organic compounds of the ω-aryloxyaliphatic acid type, ost of which are new, were examined during the investigaon.

148. LARSEN, P. 577.17
Neutral auxins.
Nature, 1947, **159**: 842-3, bibl. 2.
ttempts continue to synthesize 3-indoleacetaldehyde, reviously shown by the author to be a growth hormone in gher plants. In addition, an investigation on a series of her non-acid homologues of acid auxins has been started, id their relative activity is noted in a table. Soil treatment as found to increase the activity of aldehyde preparations bout 2·5 times.—University of Copenhagen.

149. DE ROPP, R. S. 577.17
Sunflower stem cultures for the detection of plant hormones.
Nature, 1947, **159**: 606, bibl. 2.
tem fragments, 4 mm. in length, of the upper half of the rst internode were used, the sunflower plants being grown pots until the second internode was on the point of eginning to elongate. Before cutting the stem into small ieces (with a sterile scalpel) the epidermis was carefully moved. Each fragment was then transferred to an agar ope, containing the substance to be tested in addition to utrient solution. If a root-producing substance had been dded to the agar, root production was generally evident about 4 days.—New York Botanical Garden.

150. HILDEBRANDT, A. C., AND RIKER, A. J.
633.71: 577.17
Influence of some natural and synthetic growth substances on growth in vitro of excised tobacco and sunflower tissue cultures.
Abstr. *Amer. J. Bot.*, 1946, **33**: 836.
issue cultures of tobacco and sunflower galls were incubated n synthetic basal media lacking or containing concentraons from 1×10^{-1} to 1×10^{-13} grams per litre of a number of ynthetic growth substances. With sunflower tissue cultures rowth increased at low concentrations of parachlorophenxyacetic acid, and sodium 2,4-dichlorophenoxyacetate, but as reduced or stopped at higher concentrations. Cysteine ydrochloride had little effect or slightly increased growth ppeared at low concentrations, but growth was reduced or opped at higher concentrations. With tobacco tissue ultures growth with all the compounds was unchanged or ightly increased at low concentrations, but was inhibited r stopped at the higher concentrations.—University of Visconsin.

151. DE ROPP, R. S. 577.17: 632.314
The response of normal plant tissues and of crown-gall tumour tissues to synthetic growth hormones.*
Amer. J. Bot., 1947, **34**: 53-62, bibl. 16.
tem tissue of *Helianthus annuus* and cambial tissue of *inca rosea* produced roots in 0·01 p.p.m. of auxins.) p.p.m. auxin stimulated cell growth in *Helianthus* supercially like crown-gall tumour tissue, but such growths, hen transferred from the auxin, later differentiated into ormal roots. Crown-gall tumour tissue (bacteria-free) of oth species did not produce roots in the presence of auxins; igh concentration inhibited growth. Crown-gall tumour ssue appears to generate some growth hormone.—Rockeller Institute of Medical Research, Princeton, N.J.

*See also 1307.

1152. ŘETOVSKÝ, R., AND HORÁK, V. 577.17
Thiofan-2,5-dikyselina, nový rostlinný růstový působek. (Thiophan-2,5-dicarbonic acid, a new synthetic growth promoter.) [English summary 13 lines.]
Reprinted from *Chem. Listy*, 1946, Vol. **40**, p. 290, bibl. 10.
The author summarizes his preliminary report as follows: "The new compound is active for growth of yeast in the same concentration as the biotin prepared from yolk of egg. This growth substance induces adventitious roots on epicotyls of *Vicia faba* with a concentration as low as 10^{-12} molar in aqueous solution. The new compound is very effective for inducing growth of isolated plant embryos. Considering the activity of various analogous derivatives, it appears likely that additional research in this new field would produce many new active compounds. Details and discussion of experiments will be published in another paper."

1153. HSUEH, Y. L., AND LOU, C. H. 577.17: 581.142
Effects of 2,4-D on seed germination and respiration.
Science, 1947, **105**: 283-5, bibl. 4.
Experiments have shown that the auxin 2,4-D, at low concentrations (0·01%), promotes germination; but at higher concentrations (0·1%) it begins to inhibit aerobic respiration and checks germination.

1154.

a BLANK, F. 581.175.11
The anthocyanin pigments of plants.
Bot. Rev., 1947, **13**: 241-317, bibl. 594.

b BROYER, T. C. 581.11
The movement of materials into plants. I. Osmosis and the movement of water into plants. II. The nature of solute movement into plants.
Bot. Rev., 1947, **13**: 1-58, bibl. 68 and **13**: 125-67, bibl. 82.

c LARSEN, C. M. 577.17: 634.973.623
Forsøg med Vaekststofbehandling af Pilestiklinger. (The treatment of willow cuttings with growth substances.)
Reprint from *Dansk Skovforen. Tidsskr.*, 1946, pp. 433-48.

d PEREN, G. S. 634/635(931)
Horticulture and its place in New Zealand.
J. roy. N.Z. Inst. Hort., 1945, **15**: 1: 3-11.

e SHOWACRE, J. L., AND DU BUY, H. G. 577.17
The relation of water availability and auxin in the growth of *Avena* coleoptiles and its meaning for a theory of tropisms.
Amer. J. Bot., 1947, **34**: 175-82, bibl. 36.

f SUHORUKOV, K., AND SEMOVSKIH, O. 577.17
On the action of auxins upon plant cells.
C.R. Acad. Sci. U.R.S.S., 1946, **54**: 85-7.
Experiments on oat coleoptiles.

g WILSON, K. 581.12
A simple form of the Bonnier and Mangin gas-analysis apparatus.
Ann. Bot. Lond., 1947, **11**: 123-4.

h ZOHARY, M. 581.9(569)
A vegetation map of western Palestine.
J. Ecol., 1947, **34**: 1-19, bibl. 29.

TREE FRUITS, DECIDUOUS.

General.

1155. NEDERLANDSCHE ALGEMEENE KEURINGSDIENST. 634.1/7: 632.9
Reglement en voorschriften voor de keuring van fruitgewassen. **(Rules and instructions for the inspection of fruit plants.)**
N.A.K. Afdeeling Tuinbouw, 1938, pp. 46 [received 1947].

The purpose and aim of the Dutch inspection service for fruit plants and the general regulations are set out in 39 articles. The fruits are then taken in alphabetical order of their common (Dutch) names and the particulars to be observed when inspections are made are given for each.

1156. FOLLEY, R. R. W. 634.11: 338
Studies in the economics of fruit production and marketing. No. 1. The economic position of apple growers [in Great Britain].
(Publ.) Inst. Res. agric. Econ., Oxford Univ., 1947(?), pp. 5, 1s.

This analysis of the overseas and British market position shows that the outlook for British apple growers is good. The curtailment of new plantings in all producing countries during the war and the reduction in imports of such fruits as citrus and bananas, which compete with apples, has led to a position on the home market of reduced supply and temporarily increased demand. As a result of a long-term favourable trend the estimated area under table varieties of apples reached the record figure of 132,500 acres in 1946. The ratio of non-bearing to productive orchards was 1 : 7 in 1940 and dropped to about 1 : 22 in 1944. The general use of rootstocks inducing early cropping may make 1 : 9 the standard ratio for modern orchards, as compared with 1 : 6 accepted as necessary before. Partly owing to the virtual failure of the crop twice in every 10 years as a result of frost damage, average yields of table apples in Britain are as low as 115 bushels per acre, as against 270 bushels in Australia and New Zealand and almost 400 in British Columbia, production costs being very similar in all these areas. In 1939, the average consumption of fresh table apples in Great Britain was 26 lb. per head, of which 15 lb. were imported. It is suggested that consumption could easily be raised to 30-32 lb. as a first step, which—with a reduced volume of imports—might perhaps be equivalent to an average supply of 300,000 tons of English fruit. This means that production figures would range between 90,000 and 500,000 tons. It is desirable therefore that outlets in processing channels should be available in years of maximum crop. British growers, the author assures us, need not fear an appreciable fall in the price of good quality table fruit until pre-war production has been exceeded by more than one-third.

1157. KEMMER, E., AND REINHOLD, J. 634.1/8: 338.63
Die Wertabschätzung im Obstbau. **(The valuation of fruit trees.)**
Grundlagen u. Fortschritte im Garten-u. Weinbau, 1941, Heft 7, 2nd edition, pp. 144, RM. 3.60 [received 1947].

For a brief review of the first edition, published in 1935, see *H.A.*, 5: 163. The second edition is enlarged, but its most important feature is the simplification of methods, made possible by further investigations. This applies particularly to the tables of factors (Faktorentafeln), giving index figures by which average yields should be multiplied in order to arrive at the present value of a tree or orchard. For a dessert pear or sweet cherry, for instance, with a productive life of 55 years, the index figure would be 8·9 in the first year of cropping, i.e. with 55 productive years ahead, rising to 16·5 in the course of 18 years (with 37 productive years ahead) and falling to 3·0 after another 27 years. In this manner the tables present index figures for all ages of most kinds of fruit from strawberries to walnuts, due consideration being paid to variations in the productive life due to rootstock and variety.

1158. ABRAHAMSEN, M. A. 634.11: 338.63
Income from apples in the Eastern Panhandle [West Virginia].
Bull. W. Va agric. Exp. Stat. **328,** 1947, pp. 71.

The bulletin enables growers to compare their own performance with that of other producers in West Virginia, where apples constitute the most important cash crop. Orchards yielding less than 200 bushels per acre tend to be unprofitable.

1159. NEL, R. I. 634.1/8(68)
Improving the fruit industry.
Fmg S. Afr., 1947, **22**: 321-30.

Delayed foliation. The problem of climatic unsuitability of varieties revealed by this phenomenon was approached mainly along three lines: (1) the application of direct control measures, (2) the testing of varieties for resistance to delayed foliation, and (3) the replacement of undesirable varieties by others. Investigations into the effect of time of pruning on delayed foliation were continued with Peregrine and Early Dawn peaches. Again late pruning induced a 100% increase in yield as compared with early pruning. Time of application tests were laid down to test the effect of oil sprays on delayed foliation in prunes, apples and pears. The use of di-nitro-cresol in oil emulsions is also to be tested.

Variety studies. The mid-season desert peach, Boland, is exceptionally resistant to delayed foliation.

Nutritional deficiencies. Spectro-analysis is being increasingly employed in determining nutritional deficiencies of plants and special methods have been devised.

Picking, storage and transport. The results from the studies of the factors influencing the standard and keeping qualities of apples, pears and grapes are briefly reported.

Entomology. An outline of the results from investigations on the control of the codling moth and other orchard pests is given.

Diseases of orchards and vineyards. Peach mildew, *Oidium leucoconium*, is still viewed as serious. Treatments are described. Bacterial blight of vines, *Erwinia vitivora*, should in future be viewed more seriously.

Fruit and vegetable preservation. Investigations were carried out into the following: the vitamin C content of new guava crosses and selections; the pectin changes in plum varieties; the canning and jam-making qualities of certain plum varieties; the influence of climate, variety, ripening, temperature, gas treatment, etc. on the quality and keeping properties of canned pears; the suitability of strawberry and fig varieties for preserving; and the preparation, pre-treatment and suitability of vegetable varieties intended for processing.

Top-working. While stub-grafting of apples and pears is the most expensive method, it has been found to be the most economical because of the early crop and high yield obtained.

Grapes. The results from pruning and topping experiments and the study of shoot growth and bunch thinning are described.

Apples. Alpha-naphthaleneacetic acid and certain hormone sprays gave satisfactory results in preventing the premature drop of fruit.

1160. BIAŁOBOK, S. 634.1/2(438)
Ogrody Kórnicke w czasie okupacji (1939-1945 R.) i w obliczu nowych celów. **(The Kornik Gardens during the occupation and their future.)** [English summary 2 pp.]
*Pamietnik Zakładu Badania Drzewii Lasu W. Kórniku,** 1946, Zesz. 1, pp. 37-47.

The scientific work of the Kornik Gardens for the improvement of horticulture was neglected from the year 1942.

* Diary of the trees and forest research institute, Kornik

vhen the Germans began to despoil, until the end of the occupation. The gardens are, however, said now to possess one of the finest collections of fruit trees suitable for use in he north of Europe. Investigations envisaged for the mmediate future will concern the raising of fruit trees esistant to low winter temperatures, the selection of frost-esistant rootstocks, vegetative propagation of rootstocks nd stock : scion compatibility.

161. SKARD, O. 634.1/7(481)
Norsk fruktdyrking, erfaringer og framtidsmål. **(Fruit growing in Norway, experiences and aims.)**
Sver. pomol. Fören. Årsskr., 1946, **47**: 33-41.

This interesting survey of Norwegian fruit growing is the subject of a paper given at the 1946 spring meeting of the Swedish Pomological Society. During the war two horticultural schools were burned down, a research station was destroyed, another damaged, and stagnation was general. The position was aggravated by shortage of manure and spraying materials. Standardization of top and soft fruit for marketing, introduced in 1939, had to be given up again in 1940.

During the severe winters of 1939-42, 25% of the 54,000 fruit trees in the 7 south-eastern counties and Trøndelag were killed by frost, the percentage of total losses over the whole country being estimated as 15. The percentage of trees killed in some of the most important apple varieties was as follows: Gravenstein 42, Bramley's Seedling 36, Ribston 29, Åkerö 1, Säfstaholm 0·3, Transparente blanche 0·3, Charlamovsky 0. Rootstock influence on frost resistance was apparently insignificant. It is noted that triploidy does not reduce susceptibility to frost injury, yet so popular a variety as Gravenstein cannot be dispensed with on the Norwegian market until it is replaced by another variety of similar quality.

In general, fruit plantings in Norway are on a small scale, 75% of the trees standing in small holdings of less than 7·5 ha. of cultivated land, a large proportion of them in holdings under 2 ha. There are very few plantations with as many as 4,000 to 8,000 trees. Although hardly any commercial fruit growing is found to the north of Trøndelag, top fruit is planted up to the arctic circle. The majority of fruit trees (2 million) are concentrated in the south-east, but it is the south-west (1 million) that chiefly supplies the market, partly from orchards in under 2 ha. About 0·3 million fruit trees are in the south. Soft fruit can be grown with advantage up to the county of Troms. As an illustration of the considerable differences in climatic conditions between different regions, not even far apart, the Sognefjord is quoted, which reaches about 130 miles inland. Its coastal areas have a sea climate with mild winters, cool summers (average 11·6-12° C. June-September) and an annual rainfall of 2,500 mm. Further inland on the fjord the average June-September temperature is 13·5 to 14·0° C., and the rainfall averages 1,000-1,600 mm., but the winter is not severe. This is Norway's best pear and plum district. In the south-east the annual rainfall figure lies between 400 and 800 mm. and the summer temperature between 13 and 15° C.

A special problem of Norway's fruit industry is the production of apples which store well and the provision of storage facilities, the lack of which puts the best part of the Gravenstein crop on the market in October. Among the apple varieties grown Gravenstein holds a unique position. About 50% of the 2 million apple trees in the country are of this variety, followed by Åkerö (9·5%) and the Norwegian variety Torstein (9%), which is an excellent keeper. English varieties hardly come into the picture. Pear growing is confined to areas in the south-west with a long summer, a mild winter and fairly high rainfall. There are several regions where the climate is favourable for fruit growing but the rainfall does not reach 700 mm. Here the need for irrigation is indicated. In the south-west where rainfall is plentiful, fruit trees, except plums, thrive under sod, but in the south-east sod culture is associated with poor growth and cropping.

For pest and disease control many small fruit growers are now adopting the stationary plant system, their holdings being too small to carry an efficient spraying machine. It is a strange feature that in several of the larger fruit growing districts not a single beehive can be found. This should be remedied. Fruit marketing is in the hands of an agricultural co-operative which has branches all over the country. Lack of communications and wide distances present the main difficulties in distribution, especially in the north. The suggestions for the future, apart from those already mentioned, include variety selection for keeping quality and frost resistance, support of the canning industry and promotion of fruit research.

1162. NILSSON, F. 634.1/7(485+489)
Fruktodlingens omfattning i Sverige och Danmark. **(Fruit growing census for Sweden and Denmark.)**
Sver. pomol. Fören. Årsskr., 1946, **47**: 80-2.

The last Swedish fruit growing census, which dates from 1943, has been discussed by the author in an earlier article; see *H.A.*, 16: 1268. In the present paper he compares the latest Danish figures, dating from 1945, with those of his own country. The total number of fruit trees in Denmark is 10·2 million, 2 million more than in Sweden, the percentage of apples being 72 and 62 respectively. The figures for currants and gooseberries show the same proportion as those for top fruits, viz. 5 : 4, in the two countries. Nurseries in Denmark cover an area of 1,200 ha., i.e. about double that in Sweden. In Denmark it is characteristic of recent developments that commercial fruit production has an increasingly large share (45%) in total fruit production. This is especially true for apples, 53% of which stand in commercial orchards. Corresponding Swedish figures are not available, but the part played by commercial fruit growers would probably be somewhat less marked. Denmark's fruit production surpasses that of Sweden not only absolutely and relative to size of population but also as a result of more favourable conditions in respect of yield per unit area.

1163. NILSSON, A. 635.1/7(485)
Trädgårdsodlingen i Gävleborgs län. **(Gardening in the county of Gävleborg, Sweden.)**
Sver. pomol. Fören. Årsskr., 1946, **47**: 96-117.

Gävleborg is the smallest and most southerly of the 5 counties constituting Northern Sweden. The position and prospects of fruit growing in the county, and to some extent those of certain market garden crops, are discussed at length. Climatic conditions would allow of an expansion of fruit growing and garden crops, for market and home.

1164. PÅHLMAN, A. 634.1/7
En pomologisk debatt per gåspenna på 1700-talet. **(Pomological problems of the 18th century debated.)**
Sver. pomol. Fören. Årsskr., 1946, **47**: 83-95.

The debate ranges over such problems as the preparation of planting holes for fruit trees, the source of scion wood (from a fruitful female tree and not from a barren male tree), on the effect of an acid soil on the production of canker and other tree diseases, etc.

1165. TIMOFEEV, A. 634.11-2.111
A fruit orchard in the north. [Russian.]
Kolhoznoe Proizvodstvo (Collective Farming), 1946, No. 8, p. 44.

This is a short letter to the editor, in which the correspondent describes a successful orchard in the province of Omsk. Its area of 5 ha. includes a nursery of trees trained horizontally representing 18 European fruit varieties. Ripe large fruit has been gathered, particularly from the apple varieties Borovinka, Aport, and Antonovka.

Varieties and breeding.

1166. ZELENSKIĬ, M. 634.1/2-2.111
The variety-testing orchard at the Lenin collective farm. [Russian.]
Kolhoznoe Proizvodstvo (Collective Farming), 1946, No. 9-10, pp. 29-30.

The farm is situated in the open Donbass steppes, where hitherto fruit-growing has been ventured only in hollows and other sheltered places. The work of preparing the 100 ha. intended for fruit was begun in 1938, and is described as enormous. It was divided into 9 parts, each 8 to 12 ha., and was planted with apples, cherries, apricots, peaches or other fruit species. The land was ploughed 30 cm. deep; holes were dug in autumn and planted in spring; and the orchards were surrounded by a belt of poplar and other trees to provide shelter. The yields of different peach varieties in 1945 are recorded.

1167. NILSSON, F. 631.523: 634.1/2(485)
Berättelse över verksamheten vid Balsgård år 1945. **(Report on the work at Balsgård in 1945.**
Sver. pomol. Fören. Årrskr., 1946, **47**: 163-80.

This is the first report proper published by the Director of the young Balsgård Fruit Breeding Station, a foundation of the Swedish Pomological Society. In the autumn of the report year about 900 fruit trees of 131 varieties, including all the tetraploid types, were planted on the Station's land (total area 26 ha.) in order to have easy access to the breeding material. Further, 3,000 seedlings from earlier crosses were planted. The investigations covered the same field as in previous years, viz. (1) crossing for the production of material to select from, (2) studies of the progeny of triploid varieties, (3) the production of polyploids by colchicine treatment, and (4) the breeding of rootstocks. (1) The extent of the breeding work is evident from the 8 pages of tables recording details of all the crosses made at Balsgård, Råbelöf and Ramlösa during the period 1943-5. By far the greatest attention has been paid to apples, about 33,000 flowers having been pollinated and 15,000 resulting seedlings planted out in the nursery. About 20,000 of these pollinations were diploid × diploid. Other data relate to pears, plums, and cherries. (2) In 1945, 4 new tetraploids were discovered among the seedling plants from triploid varieties, viz. 2 from Järnäpple and 2 from Canada Reinette. Moreover, 3 seedlings with a higher chromosome number than 68 were found in the progeny of Ribston. In all, 42 spontaneous tetraploids are now being raised at Balsgård: 9 from Belle de Boskoop, 5 from Järnäpple, 9 from Canada Reinette, 12 from Ribston and 7 from Husmoder (= Mère de Ménage). For a detailed report of these investigations, see *Meddel sverig. pomol. Fören.* 8; see also *H.A.*, 16: 1795. (3) Colchicine treatment of germinating apple seedlings yielded a large number of tetraploids in 1945. One seedling from *Malus sieboldii* was pentaploid (5n=85). Chromosome doubling as a result of shoot treatment has not been definitely ascertained, but in one apple and two sweet cherry shoots very large stomata were observed, which suggest that the treatment was successful. Large-scale colchicine treatment of germinating hazel seed yielded several new tetraploids. For a detailed report of the work, see *Meddel. sverig. pomol. Fören.* 10; see also *H.A.*, 16: 1862. (4) Of 701 selected apple seedlings raised at the Station, 29 showed a satisfactory tendency to ease of rooting. Layers of these were planted out in the nursery and budded in 1945. From another lot of 10,000 apple and pear seedlings 687 were selected for further testing. This included only one pear, which may not be a desirable rootstock. However, the rootstock of a certain pear tree of the variety Nouveau Poiteau was found to be easily propagated by root cuttings, and it is now being cultivated at Balsgård. Apart from selection work, rootstock breeding has been carried out with the aim of combining frost resistance with dwarfing, ready rooting and other desirable properties. For this purpose EM. IX was crossed with a number of varieties. *Cotoneaster acutifolia* and several *Crataegus* spp. are being tested as pear rootstocks, while *Prunus sibirica*, which is now being raised at the Station, may show some promise as a plum rootstock.

1168. JOHANSSON, E. 634.11: 631.541
Sort- och grundstamförsök med äpple vid Alnarp och Fjelie. Redogörelse för perioden 1934-1945. **(Apple variety and rootstock trials in Sweden, 1934-1945.)** [English summary 2 pp.] Reprint from *Årsskr. Alnarps Lantbruks-, Mejeri-Trädgårdsinst.*, 1946, pp. 277-312, bibl. 15, being *Meddel. Trädgårdsförs.* **38.**

The trials were carried out (1) at Alnarp and (2) at Fjelie near Lund on a loam soil rich in humus. (1) The scope of the Alnarp trial, in which 4-year-old trees were planted in 1937, and some of the conclusions reached may be seen from the following extract from the author's summary: "In this trial, trees of 5 scion varieties on the following rootstocks are compared: M. I, A.21, A.22, M. XIII and M. XVI. A.21 and A.22 were selected at Alnarp in 1922 and they seem to belong to the same clone as M. IV. The 5 varieties are Cox's Orange, Filippa (a Danish variety), Gravenstein, James Grieve and White Transparent. In addition Cox's Orange, Gravenstein and James Grieve on M. II, Cox's Pomona on M. I, A.21 and A.22, White Transparent on M. VI and M. XII, Gravenstein on M. IX and A.3, and James Grieve on A.3 were included in the trial. A.3 is a clone also selected at Alnarp in 1922. The growth of the trees, the flowering, the number and the weight of fruits produced and the preharvest fruit-drop were recorded. The results of the trial at Alnarp are, when comparable, generally in agreement with those reported from East Malling. The growth effect of M. I varies greatly for the different scion varieties included in the trial. The growth of the variety Filippa is about the same on M. I, M. IV, M. XIII and M. XVI. As might be expected, Gravenstein on M. IX was most precocious. The total crop of Gravenstein was higher on M. IV and M. I than on other stocks. The total yield of James Grieve on A.3 to the end of 1945 was greater than on M. XVI. A.3 seems to be a very good stock for this variety. Cox's Orange shows little difference as to total yield on different stocks, but the fruits seem to become smaller on M. I than on other stocks. The fruit of trees on M. IX and M. IV was a little better coloured and matured a little earlier than fruit on the other rootstocks." (2) In the preliminary trials at Fjelie (2-year-old trees, planted 1934) 12 combinations between Gravenstein and Cox's Orange and different rootstocks were compared. The most outstanding result of this trial is that of Gravenstein on M. II. Although trees on this rootstock were in vigorous growth, they bore fruit as early as 1939 and, moreover, yielded the heaviest crops over the whole period, closely followed by trees on M. IV."

1169. OLDÉN, E. J. 634.11: 576.312.35
En pentaploid äppleplanta. **(A pentaploid apple seedling.)** [English summary ½ p.]
Sverig. pomol. Fören. Årsskr., 1946, 37: 76-9, bibl. 9.

Among the progeny of 14 seedlings from crosses between the triploid apple variety Galloway and the tetraploid Boskoop seedling 38/1 (male) pentaploidy (5n=85) occurred in one case. The chromosome numbers of the other 13 seedlings range from 51 to 65, 4 plants having 61 chromosomes. A description and measurements are given of the young pentaploid seedling, which a photo shows to be much smaller than tetraploid and triploid seedlings of the same age (3 months).

1170. HOARE, A. H. 663.3: 634.11
Cider—the wine of England.
Agriculture, 1947, **54**: 106.
BALL, E.
Cider orchard restoration in Herefordshire.
Agriculture, 1947, **54**: 107-11.

These two articles can profitably be read together. In the first the sound theory is advanced that what the grape is to France and Italy the apple is to England. In the second the author, a member of a very famous English cider firm, points out—in other words—that one can no more expect to get vintage cider from "any old apples" than to get vintage claret from a chance vine seedling. He points out that the cider orchards of this country are inadequate to the needs of the industry and he gives an account of the far-seeing steps taken by his firm to provide for the future by the establishment of cider apple nurseries and the introduction by them—as by others also—of appropriate varieties from France. Work has also included selection of varieties already grown in Devon, Somerset and Herefordshire. To cover all the requirements between bittersweet and bittersharp varieties, to allow for variations in soil and to extend the grinding season he thinks that between 30 and 50 varieties should suffice, and he names those which he thinks suitable. Most of these have been worked hitherto on seedling stocks, but lately M. XVI has shown considerable promise in this respect. He discusses problems of planting and care in the orchard and notes, without commendation or the reverse, cultivation as bush trees. He bestows commendation on certain perry pear varieties, e.g. Arlington Squash, Gin, Chandos Huffcap, Red Horse and others. Bulmer's cider orchard restoration scheme has now been in existence for 20 years, during which time some 150,000 trees have been distributed. The war temporarily put a stop to distribution, but trees should again be available for it in quantity in 3 to 4 years' time.

1171. BALL, E. 663.3: 634.11
The raw material for cider-making.
Chem. Industr., 1946, No. 4, pp. 38-9.
The author, a member of a leading firm of English cider makers, first considers the classification of cider apple varieties into 8 groups from "full bittersharp to full bittersweet" and then deals with analytical methods of evaluation of apples for cider making. He discusses in particular the methods used for determining sugar, acidity and tannin, making a case for the use of greater uniformity of method. He considers that research is needed into seasonal and cultivation effect on the composition of apple juice.

1172. ČIRKOV, V. I. 631.541.11: 634.11 + 634.13
The utilization of the collection of apples and pears of the Leningrad Botanical Garden of the Komarov Botanical Institute. [Russian.]
A symposium on scientific work carried out at Leningrad, 1941-43, 1946, pp. 461-3. Komarov bot. Inst. Acad. Sci., U.S.S.R., Leningrad.
A description is given of 3 varieties of apple and 2 of pear which can be used for producing seedlings and rootstocks for the restoration of orchards in the north badly depleted after several severe winters. They are as follows: (1) *Malus cerasifera* × *M. domestica*—the trees aged 60-65 years; (2) *Malus prunifolia* × *M. domestica*—80-100 years old; (3) *Malus cerasifera* × *M. baccata*—as a rootstock; (4) *Pyrus communis*—30-35 years old; and (5) *Pyrus ussuriensis*—35-40 years old.

1173. WIERSZYŁŁOWSKI, J. 634.13-1.523
Studia nad grusza "Kaukaska" (od 1932 do 1945 R). **(Studies of pears from the north Caucasus.)** [English summary 2 pp.]
Pamietnik Zakładu Badania Drzew i Lasu W. Kórniku, 1946, Zesz. 1, pp. 79-126, bibl. 65.
Great differences in shape and vigour of growth are remarked. The disposition of leaves and shoots was found to agree with that noted by Tydeman at East Malling (*A.R. East Malling Res. Stat. 1938*) and to fall into 2 groups. Seeds also could be divided into 2 groups, namely those with large seeds, oblong and flat, and those with small, thicker seeds resembling those of the wild pear. Anatomical examination of stems and leaves, of both Caucasian and Polish pears, did not reveal any great differences in structure.

1174. HOWLETT, F. S., AND GOURLEY, J. H. 634.11-1.523
Characteristics of the progeny obtained from utilizing standard commercial varieties in apple breeding.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 121-32, bibl. 5.
This work at Wooster, Ohio, is in continuation of that noticed in 1942 on other apple varieties (noted *H.A.*, 12: 1246). Here the varieties under examination are Delicious, Rome Beauty, Gallia Beauty, Jonathan, McIntosh, Wealthy, and Northern Spy.

1175. HOWE, G. H., AND ROBINSON, W. B. 634.11: 577.16
Ascorbic acid content of apple varieties and seedlings at Geneva, N.Y., in 1944-1945.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 133-6, bibl. 1.
Preliminary results indicate that a high ascorbic acid characteristic may be transmitted from parent to offspring. Calville Blanc was outstandingly high in ascorbic acid.

1176. MANARESI, A., AND CAPUCCI, C. 581.192: 634.13 + 634.11
Variazioni ambientali nella composizione chimica di due varietà di pere. **(Differences due to environment in the composition of two pear varieties.)**
Riv. Frutticultura, 1941, **5**: 57-72, bibl. 33 [received 1947].
Variazioni ambientali nella composizione chimica di pere e di mele. **(Differences due to environment in the composition of apples and pears.)**
Ibid., 1943, **7**: 37-43, bibl. 26 [received 1947].
In the first of these articles details are given of the differences observed in the average weight, in the percentage of sugars, in total acidity, in dry matter and in density of juice of the fruits of the two pear varieties Spina Carpi and Scipiona grown in southern and north-central Italy respectively at different altitudes. Trials on which the second article is based refer to the above pear varieties and to the apples Decio, Campanino and Durello. The authors come to the following conclusions: (1) There would not appear to be any constant definite relation between softness of flesh and chemical composition, dry matter and specific weight, total sugars and juice density. (2) The following important fact has, however, been established, that the specific gravity, while varying between individuals of the same variety, averages 1·078 for Spina Carpi winter-ripening pears coming from southern or central Italy; 0·663 for autumn-ripening Spina Carpi grown chiefly in northern Italy; 0·899 for Scipiona pears; 0·687 for Decio apples; 0·699 for Campanino apples and 1·069 for Durello apples. (3) This demonstrates the existence of 2 sub-varieties of Spina Carpi. (4) Differences observed in pear composition in 1940 and 1942 are obviously related to place and seasonal differences. (5) Differences in chemical composition bear no definite relation to the latitude or altitude of the place of growth, and the same varieties grown in different parts of Italy are of approximately the same chemical composition.

1177. DANIELSSON, B. 634.23: 576.312.35
En spontan typ av tetraploid *Prunus avium*. **(A tetraploid type of *Prunus avium*.)** [English summary 12 lines.]
Sver. pomol. Fören. Årsskr., 1946, **47**: 69-75, bibl. 11.
The tetraploid (2n = 32) sweet cherry described was discovered in a Swedish cherry orchard, growing on a diploid rootstock. Morphologically a pure *Prunus avium*, it cannot

be supposed to be a *P. cerasus* hybrid. The 10-year-old tree has a very upright growth with thick and short annual shoots and it flowers abundantly, but drops its fruit some time after pollination. Pollen development and germination is poor, and crosses with *P. cerasus* and diploid varieties resulted in a set of 2 and 1·6% respectively. However, it is thought that the sterility in this case is purely incidental and not associated with tetraploidy. Since chromosome doubling must be presumed to have occurred spontaneously, there appear likely to be other tetraploid trees elsewhere showing normal fertility. It would be valuable for breeding purposes to locate them.

1178. RENARD, G. K. 634.22
Industrial and biological characters of the Omsk forms of *Prunus nigra* Ait. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1946, No. 7-8, pp. 34-8, bibl. 8.

The "Canadian plum", *Prunus nigra*, was introduced into Russia in 1912 by seeds received at Omsk from S. Dakota. The seedlings have shown great variation. The general characters of the species are described and an account is given of the various forms recognized at Omsk.

1179. BLAKE, M. A., AND EDGERTON, L. J. 634.25-1.521
The value of stone markings in peach varietal identification.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 100-4, bibl. 2.

Illustrations show the variation in the stone markings of different peach varieties. They are discussed.

Propagation and rootstocks.

1180. ROGERS, W. S., AND GARNER, R. J. 634.1/7(43)-1.537
Report on fruit plant nurseries and fruit research stations in western Germany and the German official fruit plant certification scheme.
Final Report British Intelligence Objectives Sub-Committee **1072**, item **22**, H.M. Stationery Office, London, 1946 (?), pp. 17.

The authors' visit to western Germany in November-December, 1945, served the dual purpose of helping the Control Commission to make the best use of the extensive areas of nursery land and of finding out what useful research work on fruit production had been carried out in Germany during the war. In the Rhineland they found the apple and pear spindelbusch trees (see *H.A.*, 16: 76) to be a feature of the region. For this tree form EM. IX is generally used as a rootstock, and this—it may be noted—is so vigorous in these favourable climate and soil conditions that root pruning is practised in some cases. [The authors determined to their own satisfaction that the vigour exhibited is really a property of the rootstock and is not due to scion rooting.] In north-western Germany, rootstock stoolbeds were so severely damaged in the winters 1939-43 that at present nurserymen there are using more seedling than layered stocks. At the Fruit Research Station, Jork, near Hamburg, it has been found that EM. XVI suffered greatly from frost. EM. IV and XI proved better for fruit set than EM. I and II. EM. VII produced large fruits but was not very strong growing, while EM. IX is unsuitable for the marshy Altenland area. In conclusion, the authors explain and comment on the nursery certification and inspection scheme* enforced in Germany.

1181. NILSSON, G. 634.1/2-1.537
Plantskolekontrollen och fruktodlarna. **(Nursery certification and fruit growing in Sweden.)**
Sver. pomol. Fören. Årsskr., 1946, **37**: 7-12.

The certification of nursery material in Sweden is carried out by the State, but the scheme is voluntary. Firms joining it label their products in a certain manner and thereby guarantee that the material has been budded or grafted with the necessary care; that the scion wood has been taken from "mother" trees or bushes which are true to varietal name; that the rootstocks recommended by the Ministry have been used; that the variety is on the Ministry's list; that the required control measures against pests and diseases have been carried out; and that all precautions have been taken, both in the nursery and in the packing shed, to prevent the mixing up of varieties. There are two grades, and the requirements for grade I are specified. Dwarf trees must have a height of stem of 30-50 cm. and must be worked on a dwarfing rootstock; the stem of half-standard trees has the same range of height, but is worked on a vigorous rootstock, while standard trees have a height of 80-100 cm. Standard and half-standard pear trees are always worked on seedling rootstocks, whereas apple standards and half-standards are occasionally obtainable on EM. XIII and XVI. The following clonal apple rootstocks are officially recommended: EM. I, II. IV, IX, XIII, and A.2. In 1935, the number of apple varieties propagated in nurseries amounted to 177 out of a total of some 400 fruit varieties. The Ministry's present list, from which the variety must be selected under the scheme, is reduced to the following figures: Apple, 25; pear, 13; plum, 9; cherry, 9; gooseberry, 12; currants, 8; raspberry, 5; hazel, 4. So far, 15 nurseries have applied for admission to the certification scheme.

* A translation of the regulations is available on application to this Bureau.

1182. POLIŠČUK, A. 631.535: 581.14
The effect of the age of the mother tree and of the respective age of its parts on the development of its sexual and vegetative progenies. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1945, No. 11-12, pp. 11-16, bibl. 11.

This article is an elaboration, with further experimental evidence, of the theory that the rate of development of vegetatively raised trees and of seedlings depends upon the tier from which the cuttings, scions, or seeds are taken from the mother tree (*H.A.*, 11: 715). Those that arise from shoots or seeds taken from the middle tier mature more quickly than those taken from a lower or an upper tier. This is associated with the different proportions of chemical constituents in those parts. Catalase, in particular, is considered to play an important part.

1183. HARTMANN, H. T. 634.63-1.535: 577.17
The use of root-promoting substances in the propagation of olives by soft-wood cuttings.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 303-8.

In trials at Davis, Calif., with Mission, Manzanillo and Sevillano soft-wood olive cuttings, more cuttings formed roots when both bottom heat and high humidity were maintained. Of the growth substances used, indolebutyric acid at 25 to 50 p.p.m. was the most successful in the promotion of rooting. Sevillano cuttings, which were extremely reluctant to root without such treatment, with it rooted 42%. Without treatment root formation occurred more readily in cuttings taken in the autumn and winter than in those taken in late spring. Very good results were, however, obtained with spring cuttings treated with growth substance.

1184. HILTON, R. J. 631.541.44: 634.1/2
Frameworking fruit trees.
Publ. Dep. Agric. Canada **781**, 1946, pp. 27, being *Fmrs' Bull.* **136.**

The bulletin gives valuable practical instructions on the technique of frameworking apples. It is outstanding in the clarity of its photographic illustrations, which picture details of grafting methods and support the argument that frameworking yields quicker returns than topworking. [See also *H.A.*, 16: 674.]

1185. KEMMER, E. 634.1/8-1.961
Bedeutung und Anzucht individueller Beobachtungsklone für die Standortforschung im Obstbau. (The significance and technique of raising fruit tree clones for observation purposes in locality research.)
Reprint from *Leistungssteigerung im Gartenbau*, Wiesbaden, Heft **1**, 1942 (?), pp. 16, bibl. 2 [received 1947].

This is a preliminary, well-illustrated account of how unknown or seedling apple rootstocks were propagated vegetatively by root grafting at the Institut für Obstbau, Berlin University. Suitable roots of older trees were uncovered and grafted *in situ* in April. A glass tube protected the scion from being covered with soil, but care had to be taken not to suffocate the scion. In order to induce the formation of fibrous roots, the root was ringed or wired a little below the union and surrounded with peat. The graft was cut off the following year. Incidentally, it was observed that below the ring in some cases buds were formed on the root which in one case developed into a vigorous shoot. This shoot, together with a piece of root, provided another rootstock. Later it was found that young roots lend themselves better to grafting than old ones, the "take" percentage being much higher. Experiments were started in which the roots of older trees were ringed in order to produce fibrous roots for grafting. In a third experiment 1-year-old seedlings were propagated by cutting the stem, from about 5 cm. above the collar upward, into 6-10 scion pieces and grafting them on their own roots. This is best done in the glasshouse in January or February. Bigger root pieces are fitted into a cleft of the scion and fastened with raffia, while smaller roots are just pinned to the scion. The grafts are then planted in the propagation bed together with the rest of the original seedling, which recovers every time. The author discusses the need for uniformity of fruit trees in locality research.

1186. WRÓBLEWSKI, A., AND BIAŁOBOK, S. 634.1/2-1.541.11
Studia nad selekcja podkładek drzew owocowych Cz. 1. **(Studies on selection of rootstocks, Part 1.)** [English summary 1 p.]
Pamietnik Zakładu Badania Drzew i Lasu W. Kórniku, 1946, Zesz. 1, pp. 143-70, bibl. 39.

Among conclusions reached are the following: *Malus sieboldii* v. *arborescens* and Antonovka propagated readily in the stool bed and from root cuttings. Root cuttings of *M. prunifolia* did fairly well but *M. baccata* and *M. silvestris* root cuttings were unsatisfactory. From the seed of all the above, trees were raised showing great diversity of growth. Of the different *Pyrus* species *P. salicifolia*, *P. communis* v. *caucasica* and *P. calleryana* all regenerated well from root cuttings. *P. ovoidea* was the worst in this respect. Of *Prunus* species *P. cerasifera* v. *divaricata* multiplied badly from root cuttings. *P. insititia* was considerably better, 7 out of 18 selected clones giving a high proportion of success. Among cherries *P. avium* was most easily raised from root cuttings, *P. cerasus*, *P. fruticosa* and *P. acida* showing considerable reluctance to root.

1187. ANTHONY, R. D. 634.1/2-1.541.11
Importance of parent tree selection in studies of seedling rootstocks.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 209-11, bibl.

The cutting off of rootstock supplies from Europe during the war led to considerable work being initiated in the U.S.A., notably in Pennsylvania. Clonal stocks have a long way to go before they are generally accepted. Meantime the aim in rootstock studies is to use seedlings of known and tested origin. There are reasons for supposing that parent trees will eventually be found, the seedlings of which will show a high degree of uniformity.

1188. SMITH, W. W. 634.11-1.541.11
Progress report of growth of apple trees on Malling rootstocks.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 114.

Circumference growth is tabulated of 8 apple varieties grown for 9 years at Gilford, New Hampshire, on Malling clonal stocks I, III, IV, V, X and XVI. It may be noted that trees on M. I are outstanding in that they are larger, have a greater circumference and are more uniform than those on any other stock.

1189. SHAW, J. K. 634.11-1.541.11
The influence of Malling clonal rootstocks on the growth of certain apple varieties.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 171-9, bibl. 11.

Long experience with Malling stocks in Massachusetts—the first lot arrived in 1924 and were propagated and studied—allows the author to summarize what is known of them there. He notes as most significant the differences in growth of any given stion [combination of stock and scion] in different orchards, due doubtless to differences in soil and cultural conditions. The following notes are from the author's conclusions: "M. VIII and IX are very dwarfing and of no value in commercial orchards unless it be in very unusual cases. Trees on M. III grow as well as any semi-dwarfing stock but show a tendency to come into bearing earlier than do M. V and VII inclusive. M. III suckers from the stock more than the others. M. IV forms poor unions with many varieties and shows weak anchorage, though it produces rather vigorous early-bearing trees. M. V seems to make rather poor producing trees, though of good anchorage. M. VI shows no outstanding value. We have had little experience with M. VII, but it is reported as having promise. This leaves M. I and II as the most promising semi-dwarfing rootstocks according to present knowledge. M. I acts as a very dwarfing stock when budded to Wealthy. Among the standard and near-standard rootstocks, M. XIII is variable in its behavior and should be discarded. M. X and XV have no outstanding value. This leaves M. XII and XVI as the most promising rootstocks in this class. . . . The final evaluation of the semi-dwarfing rootstocks (M. I and II and possibly VII) for commercial orchards is yet to be made. The writer feels that they have promise for the grower who does not like big trees in his orchard. Their great weakness is poor anchorage. This should be understood and overcome as far as possible. They should be planted about 20-30 feet apart and given good growing conditions. Properly handled, they will bear younger and probably give larger acre yields of better apples than ordinary trees. They may not live as long, which may be an advantage. . . ."

1190. GOURLEY, J. H., AND HOWLETT, F. S. 634.11-1.541.11
Malling stocks at the Ohio Agricultural Experiment Station.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 241-4.

The performance of Malling stocks I, II, IV, V, VI, VII and XIII budded with commercial varieties and under trial for the past 6 years at Wooster, Ohio, is here noted.

1191. ANTHONY, R. D., AND CLARKE, W. S., Jr. 634.11-1.541.11
Performance of clonal understocks at the Pennsylvania State College.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 212-26, bibl. 7.

A summarized account of the behaviour of the Malling apple stocks I-X, XII, XIII, XV-XVII, Crabs A, C and F, and of the Long Ashton clonal stocks E-7, G-6, G-7 and G-8, with a note on that of U.S.D.A. T-200, and shorter remarks on certain other U.S.D.A. stocks in Pennsylvania since the year 1921.

1192. SHAW, J. K. 634.11-1.541.11
The anchorage of clonal stock apple trees.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 166-70, bibl. 1.
A hurricane in September, 1944, at Amherst, Mass., resulted in considerable loss among apple trees on the Malling dwarfing stocks, amounting to 32% on M. IV and 29% on M. IX. On the other hand, trees on M. V, X, XII, XIII, XV and XVI in the same orchard were not damaged and those on M. I and II suffered only slight loss.

1193. SUDDS, R. H. 634.11-1.541.11
Twelve years' results of orchard tests with apple trees on selected rootstocks, Kearneysville, W. Va.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 180-6, bibl. 4.
Yields of Gallia Beauty, Starking, Staymared and York Imperial on variety seedling rootstocks, M. I, XIII and XV and 5 U.S.D.A. clones at Kearneysville, West Va, are compared and discussed. The Malling stocks showed no particular merit. In general, trees on U.S.D.A. clones 316, 317 and 323 outyielded the seedling stocks.

1194. YERKES, G. E., AND ALDRICH, W. W. 634.11-1.541.11
Behavior of apple varieties on certain clonal stocks.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 227-35, bibl. 14.
The authors summarize their trials on American clonal stocks at Beltsville, Md, as follows: "Apple seedlings that have unusual vigor, resistance to woolly aphis, and ready increase from root cuttings were propagated as clones, and their behavior as stocks for commercial varieties was observed. Clone 227 was incompatible with many varieties, death of the trees occurring in the first, second, or third year. Eleven clones, namely 227-2, 1227, 1232, 1256, 1267, 1270, 1283, 1288, 1291, 1300 and 1303, each caused some degree of dwarfing with specific scion varieties, but not with all. In contrast, nine clones, namely 323, 329, 1223, 1225, 1226, 1241, 1251, 1263 and 1297, when budded to York Imperial produced larger trees than did French Crab seedlings. Clone 1225 produced larger York Imperial and Jonathan trees than did clones 316, 323 and 329; and larger Yellow Transparent trees than did clones 316 and 323, by odds of 19 : 1."

1195. SUDDS, R. H. 634.11-1.541.11
Can apple trees or clonal rootstocks be recommended for commercial orchards in the Shenandoah Valley ?
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 245-8, bibl. 3.
At Kearneysville, W. Virginia, the U.S.D.A. clonal stocks, again proved to a disquieting degree susceptible to wind injury. On that account they seem unlikely to be recommended for orchard planting at present.

1196. GARDNER, F. E., MARTH, P. C., AND MAGNESS, J. R. 634.11-1.541.11
Lethal effects of certain apple scions on Spy 227 stock.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 195-9, bibl. 3.
Working Spy 227 with certain apple scions resulted in the ultimate death of the stock. If, as seems possible, a virus is responsible, then this virus must exist normally as a masked entity doing no harm to the varieties infected or to any known rootstock except Spy 227 and some derivatives of Spy 227. The authors suggest that conceivably a second factor, perhaps a metabolite, developed by certain varieties only, is necessary for the lethal activity. The phenomenon bears a striking parallelism to that seen in tristeza disease of citrus.—Beltsville, Md.

1197. JAIVENOIS, A. 634.11-1.541.11
Le type IX. Ses caractéristiques. Ses possibilités. **(The characteristics and possibilities of Malling IX apple rootstock.)**
Courr. hort., 1947, **9**: 216-7.
The author discusses the advantages and disadvantages of M. IX as an apple rootstock and sums up as follows: (1) M. IX is excellent for temporary trees of vigorous varieties and if the soil contains all the elements it requires. (2) If the growth is too weak the trees may have to be supported in some way, or it may be necessary to adopt a somewhat more vigorous rootstock (IV or II). (3) The fruit must be thinned in order to maintain regularity in cropping.

1198. BRASE, K. D. 634.11-1.841.11
Growth behavior of four apple varieties on Manchurian Crab seedling rootstocks in the nursery.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 236-40, bibl. 2.
Tests are discussed of the behaviour over the first 2 years of 4 apple varieties budded on the Manchurian Crab *Pyrus baccata mandshurica* introduced from Harbin in 1924. Cortland and Delicious produced in the nursery good smooth unions and appear likely to make long-lived vigorous and productive trees. On the other hand Virginia Crab and the red strain of Delicious did not find the stock entirely congenial.—Geneva, N. York.

1199. HILBORN, M. T., AND WARING, J. H. 634.11-1.541.11-2.111
A summary of investigations on the use of hardy trunk-forming stocks in Maine.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 151-65, bibl. 23.
A detailed account is given of experiments with 25 apple trunk-forming stocks in Maine. The Malling stocks I, II, IV, IX, XIII and XVI have proved of doubtful hardiness in the nursery. Certain other clonal stocks, Vermont 316, 317 and 323, appear to be hardy enough. Certain incompatibilities have been revealed and the stocks concerned can therefore be disregarded. A reciprocal influence with respect to hardiness in various stock : scion combinations is indicated. Thus Baldwin is tender on Hibernal but is quite hardy on Virginia Crab. Despite brittleness at the bud union, a Harbin selection of *Pyrus baccata* var. *mandshurica* shows some promise as a rootstock for some trunk formers.

1200. SLASKI, J. 634.11-1.541.11
Wyniki obserwacji nad przewodniemi. **(Fifteen years' observations on low temperature resistance of certain European, American and Asiatic fruit trees.)** [English summary (and legends) 1 p.]
Pamietnik Zakładu Badania Drzew i Lasu W. Kórniku, 1946, Zesz. 1, pp. 74-8.
A very full paper on the subject is promised in the Polish Agricultural and Forest Annual. Here we have only the conclusions reached in these Polish studies with regard to stock : scion relationships in double-worked trees. Of the 8 intermediates used for apples, namely Haas, Hibernal, Croncels, Rekord, Montwilowka, Roter Riesling, Sherik and Virginia Crab, the best results were obtained with Hibernal of Russian origin adapted in America. Out of 6 pears Sacharnaia and Old Home proved to be the best. All plums used as intermediates were killed by frost in the winter of 1939/40. Among cherries full cold resistance was shown by the variety Vilna. Evidence was given in the experimental orchard of Broniszow both of top : intermediate influence and the reverse. Results were not always in accordance with expectation.

1201. Oldén, E. J. 634.11-1.541.11
Uppdragning av äppleträd på fröstammar av kända sorter och vildtyper. **(Raising apple trees on rootstocks grown from the seed of varieties and crab apples.)** [English summary 1 p.]
Sver. pomol. Fören. Årsskr., 1946, **47**: 13-23, bibl. 5.

The first preliminary results are given of a trial, started at Balsgård in winter 1942-43, in which seedlings from a number of apple varieties and crab apples are being tested for their suitability as rootstocks. The tabulated data in the present phase of the investigations refer to the number of seeds per fruit, the weight of 1,000 seeds, the number of seedlings planted out, height, diameter and weight of the plants, percentage of saleable plants, etc. The stocks were budded in 1944 and inspected in the autumn of 1946. The highest percentage of saleable trees occurred in the progeny of the varieties King of the Pippins (52) and Flädie (34). Photographs show the growth and root system of some budded trees and rootstocks.

1202. K[emmer], E. 634.2-1.541.11
Die Steinobstunterlagen. **(Rootstocks for stone fruit.)***
Merkbl. Inst. Obstbau. Univ. Berlin 7, 2nd edition, R. Bechtold & Co., Wiesbaden, 1942, pp. 16, RM. 1.20 [received 1947].

For a short abstract of the author's bulletin on rootstocks for pome fruit, see *H.A.*, 14: 53. In the winter of 1939/40 stone fruit suffered from frost damage to the wood, while the winter of 1941/42 was characterized by damage to the roots, which is a much more serious injury. Of 124 3-year-old half-standard plum trees growing in the Institute the following percentages remained undamaged: On St. Julien seedling 70, on myrobolan seedling 15, on Marunke 11, on Brussels 7, on white myrobolan (type from Palatinate) 0. In another plot of 54 trees of the same age on St. Julien seedling, 80% suffered no injury. All trees recovered from the wood damage sustained in the winter of 1939/40. The characteristics and uses of 15 clonal rootstocks for plum, peach and apricot, of 3 clonal rootstocks for cherries and of 13 seedling rootstocks are discussed. These last lack uniformity, partly owing to lack of purity in the seedling material imported from France and the Balkans. Little is known of the rootstock effect on uniformity, but it is generally held that in stone fruit the range of variation does not equal that usually observed in pome fruit. This is illustrated by the range of variation (calculated from the standard deviation) (*a*) of trunk circumference, (*b*) of yield with (1) 74 morello cherries (12-year-old) on *Prunus mahaleb* seedling, (*a*) 21%, (*b*) 84%; (2) 60 Nancy mirabelles (5-year-old) on layers of Bühler Frühzwetsche, (*a*) 19%; (3) 99 Nancy mirabelles (5-year-old) on "true" St. Julien, (*a*) 19%; 577 plums of several varieties (5-year-old) on myrobalan, (*a*) 20-33%; (4) 49 seedlings of peach variety Roter Ellerstädter (5-year-old), (*a*) 40%, (*b*) 75%; 24 Roter Ellerstädter peach (5-year-old) on Roter Ellerstädter seedling, (*a*) 23%, (*b*) 84%. The bulletin is abundantly illustrated.

1203. Clarke, W. S., Jr., and Anthony, R. D. 634.23-1.541.11
An orchard test of mazzard and mahaleb cherry rootstocks.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 200-8, bibl. 8.

Observations and experiments at State College, Pa, show the enormous variation both in mazzard and mahaleb stocks and indicate that selection lies not as between mazzard and mahaleb roots but as between the performance of one group of seedlings from a known parent or known strain and that of another group of similar known origin. They also suggest that the performance of the rootstock may vary with the scion.

*See also 1291.

1204. Havis, L., and Marth, P. C. 634.25-1.541.11
Orchard performance of peach variety seedlings as rootstocks for peaches.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 115-20, bibl. 4.

Trials at Beltsville, Md, indicate that seeds of many peach varieties can be used as a source of seedling rootstocks for peaches in so far as vigour of orchard tree is concerned. In choosing a variety for rootstock purposes, the germination percentage and seedling capacity (based on vigour, uniformity and character of growth) should be the criteria.

1205. Hayward, H. E., Long, E. M., and Uhvits, R. 634.25-1.541.11-1.415.3
Effect of chloride and sulfate salts on the growth and development of the Elberta peach on Shalil and Lovell rootstocks.
Tech. Bull. U.S. Dep. Agric. **922**, 1946, pp. 48, bibl. 60.

In a 5-year study of the salt tolerance of Elberta peaches grown on Shalil and Lovell rootstocks, the trees were grown in large sand-culture tanks under six salt treatments as follows: (1) Control (base nutrient solution); (2) low chloride; (3) intermediate chloride; (4) high chloride; (5) intermediate sulphate; and (6) high sulphate. In the chloride and sulphate solutions the cations were supplied as sodium 65%, magnesium 25%, and calcium 10%. The studies demonstrate that it is possible to grow a tree crop to maturity with a sand-culture technique using a synthetic nutrient solution, and without the addition of organic constituents. The vegetative growth and the quality of fruit of the control trees were equal to the performance of trees of comparable age grown under orchard conditions. The data indicate that the total concentration of salt in the nutrient solution available to the roots is an important factor in vegetative growth. Regardless of the salt used, increases in the concentration of the nutrient solution resulted in decreased vegetative growth or in death when the osmotic pressure of the solution exceeded 3 atmospheres. With larger quantities of chloride salts, young leaves frequently developed tipburn. Symptoms were not so specific under high sulphate treatments. Dieback of twigs and small branches occurred under high salt treatments, being more pronounced when the added salts were sulphates. Root growth was inhibited by high salt treatments, those under sulphate treatments resembling calcium-deficient roots. The accumulation of the chloride ion in leaves increases with the increase of chlorides in the nutrient solution and is related to the severity of burning and injury. Sulphur accumulates in leaves under high sulphate treatments, but not in quantities likely to produce injury. Sodium was found in relatively small and constant quantities in leaves, despite large differences in its concentration in the salt solutions. Large quantities were found in roots, indicating that leaf analyses alone may not give complete information regarding intake and accumulation of ions. The effect of salt treatments is more pronounced on floral than on foliar development. Flower-bud development and anthesis are accelerated as the concentration of the salt treatment is increased; fruit matured 2 to 7 days earlier under the intermediate chloride treatment. The reduction in yield of fruit under the intermediate chloride treatment ranged from 36 to 60%. Yields may not be seriously reduced by sulphate salts up to approximately 4,000 parts per million, when the total osmotic pressure does not exceed 2 atmospheres. Over a longer period of years it seems probable that the effect of salt concentrations of 2 atmospheres osmotic pressure, or lower when the salts are predominantly chlorides, will reduce yields, owing to the smaller size of the trees. Quality of fruit was impaired by treatments containing intermediate quantities of chloride salts. The chemical composition of the fruit is influenced more by annual variations in climatic factors than by salt treatment. The Lovell rootstock seems preferable to the

Shalil where trees are subjected to moderately saline conditions. [From authors' summary.]

Growth and nutrition.

1206. Post, J. J. 634.1/7: 581.14
Phaenologische waarnemingen aan fruitgewassen. **(Phenological observations on fruit crops.)** [English summary ¼ p.]
Meded. Direct. Tuinb., 1947, **10**: 79-80.
A phenological chart for fruit crops is being prepared for Holland. Data are required on leaf and flower development, date of harvest, occurrence of and damage of night frosts, together with information on stock, age and situation, for the following crops: apple, pear, plum, cherry, red currant, black currant, gooseberry and strawberry. The data will be correlated with weather conditions, and it is hoped in this way to find a solution to some important problems in fruit growing.

1207. Blaser, H. W., and Einset, J. 634.11: 577.255
Leaf development in a periclinal chimera of "Spy" apple.
Abstr. *Amer. J. Bot.*, 1946, **33**: 818.
The stem apex of Spy apple consists of a two-layered surface of diploid cells covering a tetraploid central portion. The petiole is largely tetraploid. The stipules contain tetraploid veins but the surrounding parenchyma is diploid. In the blade all principal veins and many smaller veins are tetraploid. The parenchyma and epidermis are diploid.—Univ. of Washington and N.Y. State Agric. Exp. Stat.

1208. Shalucha, B. 634.25: 581.144.3: 581.192
Auxin and nitrogen content of developing peach shoots.
Abstr. *Amer. J. Bot.*, 1946, **33**: 836.
The results obtained showed no direct correlation between the auxin and nitrogen, but auxin content was correlated with cultural conditions. Maximum auxin yields and maximum vegetative growth were obtained from shoots of trees growing under sod with straw mulch.—Brooklyn Botanic Garden.

1209. Dominik, T., and Jagodzinski, S. 634.1/7: 581.144.2
Badania nad mykorhiza niektorych drzew owocowych w ogrodach Kornickich. **(Research on mycorrhiza of fruit trees in the Kornik Gardens.)** [English summary 2 pp.]
Pamietnik Zakladu Badania Drzew i Lasu W. Kórniku, 1946, Zesz. 1, pp. 48-73, bibl. 21.
The soil is of a poor sandy nature, the average pH of the surface layers lying between 5·0 and 6·5. The species examined, all of which were found to have mycorrhiza, were *Prunus armeniaca, P. insititia, P. cerasus, P. communis, P. avium, P. serotina*, Ackermann's plum, *Cydonia oblonga, Pirus calleryana, P. phaeocarpa, P. salicifolia, Malus rivularis, M. communis* subsp. *silvestris, M. purpurea*, Antonovka apple, *Juglans regia, Ribes nigrum, R. grossularia, Sorbus latifolia* and *Tilia platyphyllos*. The observations made and their possible eventual bearing on manuring are discussed.

1210. Anliker, J. 634.13-1.541.11: 634.14
Unterscheidung von Quitten- und Birnenwurzeln. **(The differentiation between quince and pear roots.)**
Schweiz. Z. Obst- u. Weinb., 1940, **49**: 401-8 [received 1947].
For the settlement of disputes between buyers of pear trees and nursery men the differentiation between quince and pear roots is of practical importance. A comparative study of cross sections showed that differences in the root structure between the two tree kinds are well defined. (1) The lumen of the tracheids in pear roots is considerably larger than that in quince, average measurements being length 58-81μ, width 46-59μ, as against 36-42μ and 25-29μ, in quince. Moreover, vessel density and distribution of size differ in both trees. (2) In pear roots the bast fibres are arranged in a single or partly double ring adjoining the cambium, while in quince groups of bast fibres lie scattered in the medullary rays between pith and bark. (3) In pear roots the bast fibres of the sieve tubes are characterized by a uniform circular cross section, uniformly thick walls and a small central cavity, whereas in quince the cross section of the bast fibres is of an irregular polyhedric shape, the fibre walls are of varying thickness and the central cavity tends to be larger.

1211. Polišćuk, A. D. 634.11: 581.44/45
Details of regularities in the morphogenesis of apple trees. [Russian.]
Proc. Leninakad. agric. Sci. U.S.S.R., 1947, No. 1, pp. 24-8.
Data are presented to show the morphological variations in apple shoots, and chemical variation in leaves, according to the part of the tree from which they are taken. The author concludes that the cycle of growth changes in the vegetative progeny of tree forms makes newly-formed parts un-uniform in value. This lack of uniformity as growth and development of the organs proceed is reflected morphologically and chemically. Morphological and biochemical analysis allows of an accurate evaluation of the parts used for propagation, assisting and improving methods of vegetative selection, and allowing the cultivation of progeny true to the type of its vital potentialities.

*Cultural practice.**

1212. Schulz, F. 634.1/8: 631.542.27
Das Ausdünnen des Fruchtansatzes. **(Fruit thinning.)**
Merkbl. Inst. Obstbau Univ. Berlin **11**, R. Bechtold & Co., Wiesbaden, 1942, pp. 14, RM. 1.40 [received 1947].
In Germany, fruit thinning was not widely practised until about 1930, when the dwarf tree began to become a feature in fruit growing there. Since systematic experiments on the advantages of thinning under German conditions and the best methods to be employed are still lacking, the author bases his discussion largely on American work. He concludes that (1) thinning should be confined to valuable varieties, and there it is worth while only if the market price obtained for higher quality more than compensates for the reduction in yield plus labour cost; (2) thinning offers prospects of regular crops only if it is carried out early and every year, preferably immediately after the June drop, and then only, if the trees are naturally fertile. Two suggestions for further research are made: (*a*) Could not pruning take the place of thinning and would it not give even better results? (*b*) Could apple thinning not be postponed, say till August, so as to utilize the fruits for pectin and other processing?

1213. Kenworthy, A. L. 634.11-2.95
A spray mixture useful for thinning apples after bloom.
Science, 1947, **105**: 238.
A spray mixture of polyethylene polysulphide (Goodrite p.e.p.s.) and a complex product formed by the reaction of zinc dimethyl dithiocarbamate (Zimate) with cyclohexyl amine resulted in a 50-60% reduction in fruit set in Delicious and Blaxtayman apples when applied 10-14 days after full bloom.

1214. Stebbins, T. C., Neal, A. L., and Gardner, V. R. 634.11: 577.17: 632.95
Thinning apples at blossom time with growth regulating substances and oil-wax emulsions. (A progress report.)
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 63-6, bibl. 3.

*See also 1132, 1137-1139.

One year's results at Cheboygan, Mich., indicate that App-L-set plus oil-wax emulsion is an effective agent for blossom thinning, but that DN Dry-Mix No. 2 (a dinitro compound in powder form) is effective but is liable to damage the foliage. Varietal differences in response are noticeable.

1215. SERR, E. F. 634.25-1.542.27
Pole thinning of canning peaches.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 74-80, bibl. 3.

Comparison of hand and pole thinning methods in California indicates that a great saving of time is achieved by careful pole thinning. Hose-tipped poles do not scar the fruit.

1216. K[EMMER], E. 634.1/2-1.542
Zeittafel des rationellen Obstbaumschnittes. **(A time table of rational fruit tree pruning.)**
Merkbl. Inst. Obstbau Univ. Berlin **14**, 1946, pp. 11.

The author divides the history of rational fruit tree pruning into three periods: A. First intimations; from the first mention of apple propagation by cuttings in 1437 to the mention of stone and pome fruit espaliers in 1638. B. The period of the artificial build-up of the top; from the fan-shaped wall tree in 1651 to the perfection of the classic pruning method in 1890. C. The period of the natural build-up of the top; from the transition dating from 1890 to the limited-natural build-up of the top, as advocated by the author in the years 1931-44.

1217. [KEMMER, E.] 631.542: 634.1/2
Die Systematik des Obstbaumschnittes. **(The theory of fruit tree pruning.)**
Merkbl. Inst. Obstbau Univ. Berlin **10**, 3rd edition, Limes-Verlag, Wiesbaden, 1946, pp. 24.

This bulletin is anything but an introduction for beginners; it is a technical discussion of the *theory* of fruit tree pruning, clearly bearing Kemmer's stamp in the systematic arrangement and classification of the subject matter. The divers pruning methods, their function and historical development, are discussed under headings, which might roughly be translated as follows: (1) Pruning in the nursery. (2) Tree framework building. (3 and 4) Corrective pruning. (5) Pruning to maintain crop. The author complains that no funds are available for pruning research, the problem being generally regarded as solved in principle. He contends that we have made very little progress in the theory of pruning during the last 100 years and that the art possessed by the great masters 250 years ago, though not based on detailed knowledge of anatomy and physiology, was infinitely superior to our own. We have added little enough to the empirical rules compiled by J. de la Quintinye in 1690. In order to understand the historical development one has to remember that the initial object of pruning was the artificially shaped top. From here the more naturally shaped crown was gradually developed, not because the first method was physiologically unsound, but chiefly owing to increasing cost of labour and for other economic reasons. One of the author's suggestions is that a grower might prune one-third of his young orchard lightly for early bearing, a second third moderately, and a last third severely for quality fruit. When the last lot comes into bearing, the tops of the first should be built up by rehabilitation pruning. Apparently, this suggestion is meant to apply particularly to acid cherries and berry fruit, where so much higher yields are obtained during the first 4-6 years if the trees and bushes are left unpruned. In their first year of proper cropping the performance of the following tree forms of 9-year-old apple standard trees of various varieties was compared: (1) Unpruned, (2) heavily pruned, (3) moderately pruned. A. *Total yield*: (1) 63 kg.=100%; (2) 18 kg. (28%); (3) 42 kg. (67%). B. *Fruit set on 1-year-old wood*: (1)=100%; (2) 50%; (3) 85%. C. *Weight of single fruit*: (1) 78 g. (=100%); (2) 113 g. (145%); (3) 108 g. (138%). D. *Diameter of top*: (1) 3·60 m. (=100%); (2) 2·00 m. (56%); (3) 2·90 m. (81%). The presentation of the subject is stimulating and supported by many diagrams and photographs.

1218. JAIVENOIS, A. 634.11-1.546
Le fuseau palisse. **(Spindle bush cultivation.)***
Courr. hort., 1947, **9**: 29-30.

The German "Spindelbusch" method of training apple trees is described. Maiden trees are planted out, each provided with a stake projecting 2 metres above the soil. The rootstocks are dwarfing types (9 or 11 [presumably II is meant.—Editor] according to the nature of the soil). Growth is rapid and the stem is tied to the stake for support as necessary. The lateral branches are thinned out and are not allowed to exceed 75 cm. in length; when well developed they are lowered to the horizontal position and maintained there by a galvanized iron wire spiral or by raffia. The trees begin to fruit in their second year and from then onwards the weight of the fruit keeps the branches in position without any further aid.

1219. ALDRICH, W. W., AND OTHERS.
634.13-1.542-1.67
Pruning of Anjou pear in relation to irrigation practice in a clay adobe soil.
Bull. Ore. agric. Exp. Stat. **436**, 1945, pp. 24, bibl. 10.

The effects of pruning Anjou pear trees on clay adobe soil were studied at Medford, Oregon, from 1933 through 1942. (1) With no pruning either during 1 year or for 8 consecutive years, so few blossoms set fruit that the trees produced only a light crop. Either light or heavy pruning, as compared with no pruning, increased the percentage of blossoms setting fruit, and consequently the number of fruits per tree. (2) Heavy pruning [cutting off at least three-quarters of the previous season's shoot growth and cutting back more than half of the remaining shoots] as compared with light pruning, greatly stimulated the rate of shoot growth and slightly stimulated the rate of fruit growth. (3) Heavy pruning, as compared with light pruning, did not appear to influence the amount of feeder roots developed. (4) In orchards where fruit growth is retarded by soil moisture deficiencies a relatively heavy pruning is necessary to stimulate fruit growth sufficiently to have a large proportion of the crop in the "180" size or larger commercial sizes. (5) Under normal conditions of temperature and evaporation and with sufficiently frequent irrigation to maintain adequate, available soil moisture for normal fruit growth, a relatively light pruning [cutting off half of the previous season's shoot growth and cutting back shoots at the ends of scaffold branches] each year will give as great an average annual yield as heavy pruning. (6) When the market demand is for the smaller sizes, light pruning will be satisfactory. When the market demand is for the larger commercial sizes of fruit, however, a relatively heavy pruning may be expected to stimulate growth rate of the fruit without appreciably reducing yield per tree. (7) In the case of trees whose fruits develop cork spot in some years, relatively light pruning each year may prove desirable. [From authors' summary.]

1220. MARANI, M., AND OTHERS. 634.25-1.542
Influenza della potatura della chioma sull' accrescimento di giovani piante di pesco. **(Effect of pruning on growth in the young peach.)**
Riv. Frutticultura, 1941, **5**: 1-16 [received 1947].

Groups of 10 peach trees each, raised from seed, were planted out in 1936 from seed sown that year and in 1938 and 1939 were submitted respectively to the following pruning: no pruning, removal of 25%, 50%, 70% and 100% of branches. It was found that any form of pruning reduced growth, though the effect of the 25% cut was very small. The conclusions reached are that pruning should

* See also H.A. 16:76.

be less severe than has previously been customary and that investigation is necessary into a form of crown—to be achieved by pruning—which will ensure the best utilization of light. The paper is excellently illustrated.

1221. DOTTI, F. 634.13-1.542.24
Influenza della decorticazione anulare del pedale sulla produttività del pero. **(The effect of trunk ringing on pear cropping.)**
Riv. Frutticultura, 1941, **5**: 17-20 [received 1947].

Ringing was practised on 11-year-old Williams pears worked on seedlings, growing in sandy soil, 4 lots of about 5 pears being ringed and 3 lots left untreated. It consisted of the removal of a complete ring of bark, 1 cm. wide, from the trunk at 50 cm. above ground at a time when the flowers were starting to fall. The wound was at once covered with paraffin melted at a temperature of 70° C. and it had completely healed about 70 days afterwards. The increase in crop following the ringing varied from 6·61% to 17·84%.

1222. KEMMER, E., AND SCHULZ, F. 631.547.4: 634.1/2
Die Blühreife und ihre besondere Beeinflussung im Obstbau. **(The induction of flowering and how it can be influenced in fruit trees.)**
Merkbl. Inst. Obstbau Univ. Berlin **12/13**, R. Bechtold & Co., Wiesbaden, 1943, pp. 26, RM. 2.60 [received 1947].

The theory of flower induction in plants in general is discussed at some length, and various methods of influencing the process in fruit growing are described. The effect of the rootstock on fruit set was demonstrated in an experiment: Twenty Croncels apple trees on a Paradise rootstock, planted in 1936, were inarched with a seedling rootstock in 1939. Average yields during the period 1937-41 were 1·14 kg. per treated tree and 1·16 kg. in the controls. During the period 1942-43, when the seedling made its influence felt, yields of the controls went up to 3·05 kg. and those of the inarched trees only to 2·20 kg. Ringing is a practice that should be much more generally used. Kemmer showed in 1943 that bast ringing does not cause any damage to the stem and that the bark may be peeled off even in considerable width, provided the underlying tissue is not injured in the operation [see next abstract]. In 7-year-old Boskoop bush apple trees on a vigorous rootstock ringing raised the average yield from 13 kg. in the controls to 50 kg. in the following year. Tying down the branches or holding them down with clamps [for a description, see *H.A.*, 13: 1187] is another means of inducing flowering at an early stage. If applied to trees on dwarfing rootstock tying down may lead to exhaustion, but it is advantageous on vigorous trees. For instance, 4-year-old Boskoop half-standard trees on EM. XVI had set fruit in 1943 on branches that had been bent down the previous year, while untreated branches were still in vigorous growth. Normally, vigorously growing branches, which might upset the balance of the top, are cut out completely; bending them down, however, controls their vigour and they may be saved. Nitrogen manuring as a remedy for the inhibition of flowering by exhaustion is also discussed. Many of the points made by the authors are illustrated by well-chosen, clearly-reproduced photographs.

1223. KEMMER, E. 631.542.24: 634.1/2
Versuche zur Klärung der Ringelungstechnik. **(An experimental study of the technique of ringing fruit trees.)**
Reprinted from *Dtsch. Obstb.*, 1943, Vol. **58**, H. 9, pp. 4 [received 1947].

In elaboration of the statements made in *Merkbl. Inst. Obstbau Univ. Berlin* 12/13, a few further details are given on the technique of bast ringing in fruit trees. It is most important that the operation should be carried out during the main growth period, i.e. in June or July. In that case the cambial zone is not injured, at least in pome fruits, and cell production continues normally in the tissue below the wound, so that a thin but uniform layer of bark is formed before the winter. Covering the wound with grafting wax is not necessary. Healing-over seems to be most uniform and smooth in the case of a large wound, possible because the adjacent sound parts of the bark cannot draw so much of the reserve material to themselves. In trees with rings of a width of 15 cm. no damage was apparent, even after several winters. Photographs show a half-standard apple tree, (1) in early June, 1943, with its bark peeled off over the whole length of the stem (1·30 m.), and (2) 8 weeks later, when the stem was covered with a light grey bark. No protective covering was applied, but the tree does not seem to have suffered. The ease of the bast ringing technique will allow ringing studies on a bigger scale, which it is proposed to carry out. Problems remaining to be solved include the response of stone fruit to bast ringing—sweet and acid cherries seem to regenerate rapidly—and the different effects of wood and bast ringing on growth and yield in pome fruit.—Inst. Obstbau Univ. Berlin.

1224. KEMMER, E. 631.541: 634.1/2
Über Verwachsungsversuche an Obstbäumen. **(Bridge grafting experiments.)**
Reprint from *Rhein. Monatschr. Obst-, Garten-u. Gemüseb.*, 1941, H. 11, pp. 2 [received 1947].

Where ringing is considered desirable but dangerous, the following method may be applied: A ring of bark, 2-12 cm. wide, is peeled off the stem in various stages. Immediately after a piece of bark has been removed, the wound is bridge-grafted with dwarfing scions such as Paradise, Doucin or quince. The author reports good success with this operation, which should be carried out between May and July. Photographs illustrate the technique.

1225. MANSILLA, E. E. L. 634.11: 577.17
Eficacia de la aplicacion de hormones para evitar la caida de fruta en manzanos. **(The value of hormone sprays against fruit drop in apples.)**
Publ. Ser. A Inst. Sanidad veg., B. Aires, **23**, 1946, pp. 1-8, bibl. 4.

A commercial preparation, "Frutone", was applied by knapsack sprayer to Delicious apples in 1942/43 in Tamberias, and to Walingde and Huidobro in 1945/46 in Desemparados. With the third variety there was a significant reduction in fruit drop; on this scale it was not economic.

1226. SWARBRICK, T. 577.17: 634.11-2.111
Use of growth-promoting substances in the prevention of apple drop following frost.
Nature, 1945, **156**: 691-2.

Further notes on experiments with Miller's Seedling and Cox's Orange Pippin trees at Long Ashton referred to in a previous article, *ibid.*, 156: 300; *H.A.*, 15: 1810. Substances (not specified) entirely successful in Miller's Seedling were without effect on Cox. The amounts used were excessive and treatment suppressed the current year's extension shoot growth, an undesirable feature. The results are highly suggestive of future possibilities.

1227. JOHANSSON, E., AND ÖSTLIND, E. 577.17: 634.1/2
Prövning av olika preparat till förhindrande av fruktfällning. **(Testing materials for the control of preharvest fruit drop.)**
Sverig. pomol. Fören. Årsskr., 1946, **47**: 24-31, bibl. 6.

Six preparations were tested on a number of apple varieties. Best results were obtained on Lord Lambourne, where Phyomene reduced the fruit drop from 4% (unsprayed) to 1·9%, and on Worcester Pearmain, where the respective figures for Estone were 1·3 and 0·5%. The tests were carried out by the fruit department of the State Horticultural Institute.

1228. Allen, F. W., and Davey, A. E. 577.17: 634.13 + 664.85.13
Hormone sprays and their effect upon the keeping quality of Bartlett pears.
Bull. Calif. agric. Exp. Stat. **692,** 1945, pp. 45, bibl. 4.
For an abstract of a shorter paper by the authors under the same title see *H.A.*, 16: 1830. The bulletin contains 23 pages of tabulated data.

1229. Baker, C. E., and Burkholder, C. L. 634.25-1.8
Observations on the abnormal preharvest dropping of Elberta peaches during the summer of 1945.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 67-70, bibl. 1.
These trials at Lafayette, Ind., suggest that lack of available nitrogen during the second period of growth in peach fruits, when the pit is beginning to harden and development of the cotyledons is taking place, is connected with abnormally large drop.

1230. Compton, O. C., and others. 634.11
Color standards for McIntosh apple leaves.
Bull. Cornell agric. Exp. Stat. **824,** 1946, pp. 15 + 2, bibl. 10.
Subtitled "preliminary studies of leaf color in relation to nitrogen fertilisation" this bulletin comes with a colour chart (*Bull.* 824A) for estimating N content of the leaves and hence manurial requirement of the trees; there is a high correlation, +0·938, between chlorophyll and N.—New York State.

1231. Ulrich, R., and Lafond, J. 634.11-1.547: 664.85.11
Observations sur les caractères de prématurité des pommes var. Calville blanc destinées à l'entreposage frigorifique. **(Prematurity characters of Calville Blanc apples destined for cold storage.)**
C.R. Acad. Agric. Fr., 1947, **33**: 114-7.
The fruit was picked at intervals (of 6, 7 or 8 days) from 12 September to 31 October (before the climacteric stage) and subjected to tests for colour, odour, flavour, firmness, succulence, starch content, sugar content, pips (colour), pH of expressed sap, total acidity and specific gravity of the expressed juice. The results are represented graphically. Some of the characters, such as firmness and acidity, decreased more or less gradually during the period, but starch completely disappeared between 18 and 25 October, and the relation reducing sugars/saccharose rose rapidly between 11 and 18 October.

1232. Spafford, W. J. 634.1/8-1.8
Horticultural fertilizers and their reaction and chemical change in the soil.
J. Dep. Agric. S. Aust., 1947, **50**: 351-2.
Providing bulky organic matter consisting of easily decomposable green manuring crops grown with the aid of superphosphate, and adding sulphate of ammonia after the organic matter has been ploughed in, are all that are necessary in the River Murray fruitgrowing areas to keep the soils in good condition for growing fruit trees and vines.

1233. Reuther, W. 634.1/8-1.416.4
Studies concerning the supply of available potassium in certain New York orchard soils.
Mem. Cornell agric. Exp. Stat. **241,** 1941, pp. 51, bibl. 73 [received 1947].
A condition of young fruit tree plantings called "scorch", characterized by low vigour of the trees and marginal necrosis of the foliage, is described in this memoir. 2. Analyses of foliage samples from numerous New York orchards, both normal and scorched, show that the foliage of the scorched trees is abnormally low in potassium content. Analyses of soil samples show that a low level of potassium availability, as indicated by exchangeable and Neubauer values, is associated with scorch of fruit trees. 3. Several cases were noted of marked improvement of the foliage condition on severely scorched trees and in general vigour of trees, by application of farm manure. Data are considered which indicate that the manure treatment is associated with an increase in the potassium content of the foliage. 4. Greenhouse studies with apple seedlings growing in pots containing selected New York orchard soils, show that a response to potash fertilization may be obtained with certain soils. 5. A close correlation is found between the native exchangeable-potassium content of the soil, and the percentage of potassium in the dry matter of foliage from control pots receiving no potash treatment. 6. The possible implications of these studies for orchard practice are discussed. It is suggested that most of the evidence here considered indicates rather strongly that at least some cases of foliage scorch of fruit trees in New York are due to a deficiency of available potassium in the soil. [From author's summary.] The presentation and discussion of the data are preceded by a review of the literature.

1234. Bartholomew, O. F. 634.1/7-1.471
Soil survey of the Dalles orchard area, Oregon.
Stat. Bull. Ore. agric. Exp. Stat. **424,** 1944, pp. 16 [received 1947].
Preparatory to fruit investigations by the Oregon Agricultural Experiment Station, the Bureau of Plant Industry and others, undertook a soil survey of the Dalles orchard area, the results of which are mapped and discussed. Despite the low annual rainfall of 12·7 in., irrigation can be practised only in a minority of orchards, where water is available, and there it must be applied lightly by the sprinkler system because of the great erosion hazard created by steep slopes. Instead of the frequent, clean and deep cultivation, generally carried out, shallow cultivation for weed control and the maintenance of a surface mulch are recommended.

1235. Visser, W. C. 634.22-1.41
Bodemeigenschappen en de groei van pruimen. **(Soil properties and the growth of plums.)** [English summary ½ p.]
Meded. Direct. Tuinb., 1947, **10**: 31-41.
The adaptation of a geological survey to work on soil amelioration and drainage requires an exact characterization of the soil-profile concerning the quality and quantity of its properties. A knowledge of the clay content, the degree of penetration of the air and the hydrologic properties, may indicate the suitability of the profile for a certain crop. It may also be deduced whether or not an improvement in the crop-producing capacity may be attained by artificial interference. Graphs show the influence of the clay contents for three successive depths, of the depth of penetration of the air, and of pH. The influence of pH within the limits shown (6-7·5) appears to be very slight. The depth of the water level is important; young trees require a higher water level than older trees. Controlling the water level is one of the most promising means of improvement. It is suggested that satisfactory growth of fruit trees may be obtained on soils hitherto considered unfit for fruit culture by remodelling the polder design and lowering the water level. A marked improvement in growth may be brought about by drainage.

1236. Merrill, T. A. 634.1/2: 631.51
Soil management practices in the orchard.
Bull. Mich. agric. Exp. Stat. **199,** 1946, pp. 30.
Practical measures to avoid erosion in the young and in the bearing orchard.

1237. K[EMMER], E. 634.1/8(43)
Betriebswirtschaftliche und physiologische Betrachtungen über die Mischkultur im deutschen Obstbau. **(Economical and physiological reflections on the intercropping of fruit trees in Germany.)**
Merkbl. Inst. Obstbau Univ. Berlin **9**, R. Bechtold & Co., Wiesbaden, 1941, pp. 20, RM. 2 [received 1947].
Intercropping fruit trees with soft fruit, vegetables, grass and other crops is widely practised in Germany, especially on peasant farms. The diagrams, photographs and data presented here go to prove that, with certain exceptions, the system is harmful to both trees and the crops grown between them. Shortage of land was responsible for the origin of this practice, and it cannot now be defended on any other grounds. Where intercropping is unavoidable, prune judiciously, allowing sufficient light to reach the ground, exclude all plants sensitive to shade and competing with the trees, and crop only the lightest strip between the rows. Prosperity of the fruit trees must be the first consideration.

1238.

a BLAKE, M. A., AND EDGERTON, L. J. 634.25
Standards for classifying peach characteristics.
Bull. N. Jer. agric. Exp. Stat. **728**, 1946, pp. 55, bibl. 21.

b BLOSSER, J. H., FRANKLIN, E. R., AND MUMFORD, D. C. 631.16: 634.11 + 634.13
Man labor requirements for apples and pears in the Hood River Valley, Oregon.
Stat. Bull. Ore. agric. Exp. Stat. **420**, 1944, pp. 22.

c BONIFACIO, P. 631.874: 634.1/8
L'*Astragalus Boeticus* ottima pianta da sovescio per frutteti. **(*A. boeticus* an excellent green manure plant for orchards.)**
Riv. Frutticultura, 1941, **5**: 102-4 [received 1947].
In Sicily.

d ENGSTEDT, G. 634.1/7 + 635.1/7
Något om den engelska trädgårdsodlingen under andra världskriget. **(Fruit and vegetable growing in England during the war.)**
Sver. pomol. Fören. Årsskr., 1946, **47**: 146-62.

e K[EMMER], E. 634.1/8(43): 338.63
Obstbauliche Leistungszahlen. **(Yield and cost figures in German fruit growing.)**
Merkbl. Inst. Obstb. Univ. Berlin **3**, 3rd edition, Limes-Verlag, Wiesbaden, 1943, pp. 16, RM. 0.90.

f KUHLMAN, G. W., BLOSSER, J. H., AND MUMFORD, D. C. 634.11 + 634.13
Cost of producing apples and pears in the Hood River Valley, Oregon.
Stat. Bull. Ore. agric. Exp. Stat. **429**, 1945, pp. 22.

g ROBERTS, R. H. 634.11
Notes on apple set and growth, 1945.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 59-62, bibl. 2.
Record of observations at Madison, Wis.

h SCHRADER, A. L. 634.11-1.541.11
Summary report of twenty years of rootstock work with tree fruits at Maryland Agricultural Experiment Station.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 190-4, bibl. 32.
Methods and technical detail discussed.

SCHWAN, B. 638.12: 632.184
Förgiftning av bin genom rökgaser från industrianläggning. **(The poisoning of bees by smoke gases from industrial plants.)**
Växtskyddsnotiser, 1946, Nr. 4, pp. 59-62.

j SUDDS, R. H. 634.11-1.541.11
Growth and fruitfulness of two apple varieties, Winesap and Delicious, on French Crab seedlings and on the T-200 clonal rootstock [at Morgantown, W. Va].
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 187-9, bibl. 2.
No significant differences observed.

k WRIGHT, K. T., AND TOENJES, W. 634.11 + 634.13: 631.16
Apple and pear costs in Michigan.
Circ. Bull. Mich. agric. Exp. Stat. **202**, 1946, pp. 14.

SMALL FRUITS, VINES AND NUTS.

1239. TERRY, H. B. 634.7
Berry culture.
Fmg S. Afr., 1947, **22**: 377-80, 90.
A practical, illustrated article on the cultivation, management, harvesting, etc., of various berry fruits, including loganberries, boysenberries, youngberries and dewberries.

1240. WALDO, G. F., WIEGAND, E. H., AND HARTMAN, H. 634.7-1.523
New berries from Oregon's plant breeding research.
Stat. Bull. Ore. agric. Exp. Stat. **416**, 1943, pp. 12.
Resulting from the co-operative breeding project, five new varieties of small fruits have been named and introduced. Many other selections of these small fruits are under tests and may be introduced in the future. (1) The Corvallis strawberry was named and introduced in 1930 and has become an important variety in the Willamette River bottom soils. It is excellent in the frozen pack, is good as a canning variety, and has excellent dessert quality as fresh fruit. It has not yielded well on the hill soils of Oregon; its later berries to ripen run down in size, and its skin is tender, making it unsuited for long-distance shipping. (2) The Brightmore strawberry was named and introduced in 1942. In tests it has outyielded other varieties under most conditions, except on the heaviest soils. It is a firm, bright-red variety especially well adapted for freezing and preserving. (3) The Pacific blackberry was named and introduced in 1940. It is a black-fruited variety of the Young and Boysen type, but of higher flavour. In shape and size it is similar to the Logan, but it is not so acid as the Logan. It is excellent for frozen pack and for canning. (4) The Cascade blackberry was also named and introduced in 1940 and it is similar in plant and berry to the Pacific. It is softer than Pacific and therefore does not have so good an appearance as that variety. Its dessert quality, however, is generally superior to Pacific, and for jam and preserves it is unsurpassed. It is generally more productive than Pacific. (5) The Willamette red raspberry was named and introduced in 1943. It is more productive, much firmer, and much larger than Cuthbert where it has been tested. It has been among the best varieties in frozen pack tests, and in canning tests has been rated equal to Cuthbert. [From authors' summary.]

1241. OLEJNÍČEK, H. 634.711: 581.192
Chemické složení plodů zahradních malin. **(The chemical composition of raspberry varieties.)** [German summary 1 p.]
Reprinted from *Ann. Acad. tchécosl. Agric.*, 1942, **17**: 118-23 [received 1947].
The Section for Vine and Fruit Growing of the State Agricultural Research Station, Brno, analysed raspberries

of many varieties in 1927, 1929, 1930, 1938 and 1939. The *sugar* content as invert sugar ranged from 10·31% (Magnum bonum) to 2·64% in different seasons and varieties and averaged 6·65%. High sugar contents were found in the popular varieties and especially in the yellow sorts. The *acid* is mainly citrio and, to a lesser extent, malic. Acid content ranged from 2·1 to 0·85%, averaging 1·52%. *Extract* content averaged 11·21%, varying within a narrow range only. Similarly, the *ash* constituents of the water-soluble parts showed little variation; ash content averaged 0·47%. The *alkalinity* of the ash averaged 5·3 c.c. n/1 KOH per 100 g. of the soluble part of the berry. The *residue* insoluble in water averaged 4·45%, the highest amount of residue (19·68%) being found in wild raspberries. The *pectin* content ranged from about 0·4 to 2·8%. The data, which are set out in tables with sub-titles in German, are considered important from the points of view of variety description, utilization and selection for breeding. Further data on the composition of raspberry juices and syrups as well as on vitamin C retention in raspberry processing will be published elsewhere.

1242. WOOD, L. K. 581.192: 634.7
Seasonal variation in leaf and soil potassium.
Soil Sci., 1947, **63**: 305-14, bibl. 12.

A description is given of the seasonal variation in potash content of selected leaves from red raspberry, black raspberry, boysenberry, and gooseberry plants, together with changes in exchangeable potassium content of two soils. The K content of the first mature leaf behind the growing tip was greatly influenced by K fertilization and stage of growth. At the beginning of the season's growth the carry-over from the previous year's application of fertilizers was closely related to the amount of K applied. The leaves showed wide variation in K content as they passed through the growth stages of pre-blossom, blossom, fruiting and post-harvest. The potash content was highest in the blossom stage except in black raspberries. In red and in black raspberries the lowest leaf potash was found in the post-harvest period. In boysenberries, leaf composition varied widely with treatment and stage of growth. Gooseberry leaves contained minimum potassium during the fruiting stage. Yield data showed that the application of N-P fertilizers increased the need for K, except with gooseberries. Bronzing or leaf scorch was found wherever leaf K was much lower than 1·00% prior to the fruiting stage. Recent evidence suggests that the use of a leaf segment adjacent to the fruiting tip will correlate leaf composition and need for potash with ultimate yields. This possibility is being investigated further.

1243. COOMBE, J. 634.714
Loganberry culture.
N.Z. J. Agric., 1947, **74**: 391-7.

The planting, lay-out of plantations, cultivation, pruning, training, manuring and harvesting of loganberries are described. An account with illustrations is given of four methods of training: weaving, rope, fan, and a combination of the fan and rope methods.

1244. TURNBULL, J. 634.723
Growing blackcurrant bushes for sale.
Agriculture, 1947, **54**: 80-2.

The sale of black currant bushes, other than maidens grown from certified stocks, is prohibited in the U.K. unless they have been inspected and certified under the Ministry's scheme or comparable schemes of other Agricultural Departments in the British Isles. The author in this article sets out clearly the main points which may help the intending grower most easily to qualify for the requisite certificate. He considers them under the headings of cuttings, isolation and nursery beds, diseases and pests and trueness to type.

1245. WRÓBLEWSKI, A., BIAŁOBOK, S., AND ŁEMPICKA, Z. 634.72-1.535
Obserwacje nad sadzonkami niektórych odmian porzeczek. **(Observations on cuttings of some currant varieties.)** [English summary 1 p.]
Pamietnik Zakładu Badania Drzew i Lasu W. Kórniku, 1946, Zesz. 1, pp. 127-42, bibl. 20.

Rooting, vigour of growth and resistance to *Cronartium ribicola* were determined for a large number of Polish and foreign black, white and red currant varieties.

1246. SIANES, F. 634.73
La culture des vacciniées. **(The cultivation of *Vaccinium* spp.)**
Courr. hort., 1947, **9**: 267-9, 350-2, 400-1.

The four indigenous species of *Vaccinium* in Belgium are briefly described. Their fruits are gathered but the plants are not cultivated. As interest in species of *Vaccinium* as crop plants is increasing, more detailed descriptions are given of the cranberry (*V. macrocarpum*) and the blueberry (*V. corymbosum*) and of their culture.

1247. WASSCHER, J. 634.73-1.521
De in ons land inheemsche en gekweekte Vaccinium-soorten. **(Native and cultivated species of *Vaccinium* in Holland.)**
Meded. Inst. toegep. biol. Onderz. Natuur, No. **1**, 1946 (?), 12 pp., bibl. 31.

Descriptions are given of four indigenous species of *Vaccinium*, viz. whinberry (*V. vitis-idaea*), bilberry (*V. myrtillus*), bog whortleberry (*V. uliginosum*), and cranberry (*V. oxycoccus*), and the American cranberry (*V. macrocarpon*), an introduced American species now established in Holland. This and another American species, blueberry (*V. corymbosum*), are cultivated. The properties and uses of the various species are described.

1248. BAILEY, J. S., AND FRENCH, A. P. 634.734
Identification of blueberry varieties by plant characters.
Bull. Mass. agric. Exp. Stat. **431**, 1946, pp. 20, bibl. 17.

The description of the vegetative characteristics of blueberry varieties is accompanied by excellent photographs which enhance the value of the bulletin as a guide to variety identification in the nursery.

1249. SMITH, W. W., AND OTHERS. 634.736-1.8
Response of the lowbush blueberry to fertilizers.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 263-8, bibl. 6.

Application of complete fertilizer 7-7-7 to lowbush blueberries at 200, 500 and 1,000 lb. per acre greatly increased yield and lengthened the production period of 3-year-old tops. The application of N fertilizers alone led to increased growth of weeds and of blueberry stems and to a slight increase in yield of fruit.

1250. BEIJERINCK, W., AND WASSCHER, J. 634.73-1.535
Resultaten van stekproeven met blauwe bessen. (*Vaccinium corymbosum* L. en hare hybriden), gedurende de jaren 1941 tot en met 1943. **(Trials with cuttings of blueberry in 1941-43.)**
Meded. Inst. toegep. biol. Onderz. Natuur **3**, reprinted from *Landbouwk. Tijdschr.*, 1946, **58**: 113-27.

The best medium for striking blueberry cuttings proved to be pure peat-litter. A mixture of two parts peat-litter and one part sand gave better results than a mixture of equal parts of peat-litter and sand, or of sphagnum moss alone. Results with softwood cuttings were best when cuttings were taken as early as possible after the end of the first growth.

1251. Ministry of Agriculture, London. 634.75
Strawberries.
Bull. Minist. Agric. Lond. **95**, 3rd edition, 1947, pp. 38, 2s.
The bulletin has been completely rewritten, on the same lines as the recently produced apple and pear bulletins, namely as a joint contribution from research and advisory workers. It thus brings together the most modern research findings and the best commercial practice. Special emphasis is laid on the importance of healthy stocks and their propagation, a chapter being devoted to each of these subjects. The various operations from planting to harvesting are considered in detail and a special chapter covers out-of-season production. The chapter on pest and disease control gives brief descriptions to aid the uninitiated in spotting the main troubles. Mechanization has not been introduced much into strawberry culture but the final chapter of the bulletin suggests ways in which labour might be profitably replaced by machinery. A key to the identification of the main commercial varieties completes the bulletin, making it an indispensable handbook for the grower and the advisory officer. The only point on which we would complain is the arrangement of the 27 excellent illustrations. Presumably putting them all together is an economy, but even so it is hard to see why those which clearly bring out similar or identical points are not placed together.

1252. Östlind, N. 634.75-1.521.3
Sortförsök med jordgubbar i Norrland 1942-1946. **(Strawberry variety trials in Norrland, Sweden, 1942-1946.)** [English summary 1 p.] Reprint from *Årsskr. Alnarps Lantbruks-, Mejeri-Trädgårdsinst.*, 1946, pp. 207-26, bibl. 2, being *Meddel. Trädgårdsförs.* **36.**
Strawberry trials were carried out at three stations in northern Sweden at a latitude of 62-64. In these conditions Abundance emerged as the best variety, primarily for canning purposes.

1253. Stadhouders, P. 634.75(492)
De selectie van aardbeien in Noord-Brabant. **(The selection of strawberries in North Brabant.)** [English summary ½ p.]
Meded. Direct. Tuinb., 1947, **10**: 88-93.
Strawberries in North Brabant have suffered severely from various diseases, e.g. eelworm (*Aphelenchoides fragariae*), tarsonemid mite (*Tarsonemus fragariae*), root rots and, to a less extent, viruses. An attempt is therefore being made to eliminate those troubles by rigorous selection. In the province there has been established one chief runner nursery where material from various sources is collected and carefully selected for freedom from diseases and pests. Runners from the best stocks are distributed to growers whose function it is to propagate from them in order to provide strawberry growers with the selected healthy strains. The fields of the runner-propagators are kept under supervision, and any plants showing disease symptoms are immediately removed. The chief runner nursery and the propagation nurseries must be situated outside the strawberry cultivation centres. Plants are obtained only from 1-year-old mother plants, for which new soil is taken annually. Every year the growers of strawberry plants get their mother plants from the chief runner nursery. Summer planting (from the end of July till the beginning of August) is recommended for those varieties which are suitable for this purpose. The principal varieties grown in N. Brabant and propagated in this way are Deutsch Evern and Jucunda.

1254. Gray, G. F. 634.75
Strawberry culture and varieties.
Bull. Okla agric. Exp. Stat. **B-304**, 1947, pp. 28.
Commercial strawberry growing in Oklahoma is largely confined to the eastern counties, where some areas report yields of 125 crates per acre and better, average yields for the State during the period 1936-45 being 52·4 crates. The bulletin summarizes the information gained at the Experiment Station in variety trials and tests of cultural methods as well as from observation of successful growers. Cotton burrs were found to be a good mulching material; they should be applied between 1 and 15 December where it is useful to guard against winter injury. Where no frost protection is required, the covering over the plants should be thin, but at least 2 in. thick between the rows. Descriptions are given of some 16 varieties, of which Blakemore (yellow-free strain), Konvoy, Ranger and Maytime are starred for their commercial qualities.

1255. Loomis, N. H., and Darrow, G. M. 634.75
Suwannee—a new home-garden strawberry.
Circ. Miss. agric. Exp. Stat. **123**, 1945, pp. 2.
The new variety has the same parentage as Blakemore, originating from a cross between Missionary and Howard 17 (premier). It is adapted to the south, where it is a good yielder and develops exceptionally high dessert quality, even under adverse conditions. Suwannee is not firm enough for a market variety but is strongly recommended for home gardens. It begins to ripen four days later than Blakemore and has a long fruiting season. The berry is illustrated.

1256. van den Muijzenberg, E. W. B. 634.75-1.544
Aardbeien in den winter. **(Strawberries in winter.)**
Tuinbouw, 1947, **2**: 8-11.
Methods of cultivation by which strawberries can be produced and ripened throughout the year are described. The procedure to be adopted at stated times is diagrammatically illustrated. The methods are based on the fact that for the initiation of flower buds short days (10-12 hours of light) are necessary, while the development of the inflorescence is stimulated by long days (at least 15 hours of light). The necessary adjustments are obtained by shading (to obtain short days), and by Neon lamps (for additional light when necessary). Special attention is given to the winter production of strawberries, and the technique is described under (1) pre-winter cultivation, for harvesting in December and January about 50 grams per plant, (2) winter cultivation, for fruit in January and February, also about 50 grams per plant, (3) cultivation with belated flowering, for fruit in February and March, and (4) cultivation with cooling during autumn and the provision of strong light afterwards, for harvesting to begin in February.

1257. Roy, N. 634.8(495)
La viticulture en Grèce. **(Viticulture in Greece.)**
Prog. agric. vitic., 1947, **127**: 205-13.
The economic and climatic conditions for the cultivation of the grapevine in Greece are comparable with those of the vine-growing districts in central France. The soils are mostly calcareous. The rainfall is very variable; it decreases from the north-east towards the south-east and east, measuring 800 mm. (32 in.) per annum on the Albanian border and 300 to 400 mm. (12 to 16 in.) in Crete and eastern Macedonia. Greece produces (1) dried grapes—sultanas and currants, (2) table grapes, (3) wines and alcohol. Special attention is given to the cultivation and processing of sultanas, and the organization for the production of currants is described.

1258. Olmo, H. P. 634.851: 581.145
Correlations between seed and berry development in some seeded varieties of *Vitis vinifera*.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 291-7, bibl. 6.
In varieties Burgrave, Dattier, Molinera, Muscat of Alexandria, Olivette blanche and Ribier.

1259. Levadoux, L. 634.8: 581.46
Les cépages femelles. **(Female grapevines.)**
Progr. agric. vitic., 1947, **64**: 54-60.
Certain varieties of grapevine do not produce viable pollen; they can be recognized at the flowering stage because their stamens curve back and wither soon after the flowers open.

Such varieties do not set fruit unless cross-pollinated, and this has led to their elimination from some vineyards as unprofitable, although some of them have valuable qualities. The author discusses the problem with reference to interplanting pollinating varieties, artificial pollination, and breeding with the object of producing plants with hermaphrodite flowers and with the good qualities of the female parent.

1260. Bock, E. 634.8-1.541.11
La reconstruction des porte-greffes du vignoble alsacien. **(The rehabilitation of rootstocks in Alsatian vineyards.)**
Prog. agric. vitic., 1947, **127**: 202-5.

Descriptions are given of a number of vine rootstocks suitable for use in Alsace; their merits and disadvantages are discussed. One of them, under the number 41B, is said to be highly suitable for calcareous soils.

1261. Capucci, C. 634.8: 581.192
Variazioni nel periodo di quiescenza degli idrati di carbonio e dell'azoto in barbatelle di Rupestris du Lot. **(Fluctuations in carbohydrate and nitrogen content of young Rupestris du Lot vines during the dormant period.)**
Riv. Frutticultura, 1941, **5**: 73-84, bibl. 14 [received 1947].

Observations at Bologna in the winter of 1938/39—for which details of temperature and rainfall during the period are given—show that carbohydrates gradually increased both in the aerial parts and particularly in the roots from October till the third week in November and then gradually diminished. Total nitrogen showed a gradual increase throughout the period of observation, i.e. from October to April, a fact indicating that nitrogen is absorbed from the soil during that period.

1262. Baranova, E. A. 634.8: 577.17
Effect of heteroauxin upon rooting and anatomical structure of green cuttings of vine (*Vitis amurensis*).
C.R. Acad. Sci. U.R.S.S., 1946, **54**: 729-31.

Since *Vitis amurensis*, useful because of its frost resistance, is not easily propagated by cuttings, the effect of heteroauxin was tested. Green cuttings were treated with 0·01% heteroauxin. After 7-10 days, swellings appeared on the lower end of the treated cuttings, while no swellings appeared on untreated controls. Later (15-16 days after planting), numerous roots developed from the swellings. In control cuttings root formation was 3-4 days later and the number of roots much fewer. The first adventitious roots appeared on the side where there was a bud. An anatomical study indicated that treated cuttings show hypertrophy of the bast, which grows at the expense of the parenchyma.

1263. Bernon, G. 634.8-1.535: 577.17
Amélioration de la faculté d'enracinement de certaines variétés de vignes américaines réfractaires au bouturage. **(Improving rooting in cuttings of certain poorly-rooting American vine varieties.)**
Progr. agric. vitic., 1947, **127**: 150-3.

Satisfactory results are recorded of treating vine cuttings with β-indoleacetic acid. Thus in the variety Berlandieri, cuttings treated with a concentration of 1/20,000 for 138 hours in a greenhouse yielded 100% rooted. Using the same and two other varieties in the field, increased rooting was obtained by treating the cuttings with the same substance at 1/20,000 for 24 hours.

1264. le Roux, M. S. 634.8-1.541
Yema graft of the vine.
Fmg S. Afr., 1947, **22**: 433-6, 456, bibl. 2.

The budding of vines is not usual in S. Africa. A successful method, Yema grafting, is described and illustrated. The advantages and disadvantages of budding are enumerated.

1265. Malan, A. H. 634.8-1.546
The verandah trellis.
Fmg S. Afr., 1947, **22**: 58-62, bibl. 2.

The verandah or slanting trellis system for table grapes seems particularly suitable on medium fertile soils, even under irrigation, and for varieties of medium vigour, such as Hanepoot and Alphonse Lavelée, or in cases where early thorough tipping of suckers may improve yield and quality. Among the advantages of the verandah trellis enumerated are better pollination, the avoidance of excessive topping and of bruising and scorching of the grapes, cultivation practices facilitating easy movement from one row to the next, colouring improved by exposure to sun, and adequate air circulation. Drawbacks are: (1) The cost involved in construction is high, but this is more than compensated by the advantages offered by this type of trellis over a long period; and (2) the ridges have to be dug out by hand, since ploughing lengthwise as well as crosswise is impossible. Methods of construction of the verandah trellis and the wiring system used are described in some detail.

1266. Theron, C. J. 634.8: 631.542
Winter pruning and trellising of vines.
Bull. S. Afr. Dep. Agric. **249**, 1944, pp. 25, bibl. 2 [received 1946].

Different systems of pruning and the trellising of both wine and table grapes are discussed.

1267. Williams, W. O. 634.8-1.8
California vineyard fertilizer experimentation.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 269-78, bibl. 16.

Data of the results on yield of applying N or NPK to vines at 24 centres in California are tabulated and discussed. Generally speaking, under the conditions of the experiment it appears likely that average moderate applications of nitrogen will pay their costs and often be profitable. Phosphate and potash additions appeared to be slightly detrimental. It should be noted, however, that the addition of N with or without P and K led to decreased colour in Tokay grapes, which is disadvantageous if they are grown as table grapes.

1268. Marloth, R. H. 634.521(68)
The pecan in South Africa.
Fmg S. Afr., 1946, **21**: 665-76.

While South African farmers until recently did not show any enthusiasm for growing pecan nuts, establishment and extension of orchards to-day appears to be limited only by the number of trees nurserymen are able to supply. The largest planting in the Union, totalling now about 6,000 trees, was started in E. Transvaal in 1913. It is partly on the experiences made there—although the bulk of the information comes from America—that the present article is based. The author's object is to summarize the available knowledge of growing requirements, varieties, pollination, cultural practices, harvesting and yields, and pests and diseases for the guidance of prospective growers. The list of American and South African varieties that have proved satisfactory in the Union should be of particular interest. A table adds some further information on this subject by registering tentative observations on the performance of 20 varieties. It is too early to assess the economic importance of diseases and pests to the pecan, but it is obvious that great care must be taken to avoid crown gall, which is prevalent in the Union with newly-planted deciduous fruit trees. As the pecan becomes increasingly popular in South Africa, the crop should be profitable to growers, even if a considerable drop in present prices occurs. Improved marketing methods will have to be introduced.

1269. McKay, J. W. 634.521: 581.145
Embryology in pecan.
J. agric. Res., 1947, **74**: 263-83, bibl. 15.

The purpose of the investigation was (1) to trace the morphological changes in the pecan nut from the time of pollination

to maturity, and (2) to clarify the relations between the endosperm and the embryo. The later stages of nut development are dealt with primarily. There are two periods in fruit development, (1) endosperm development during the second half of June, and July and August, (2) embryo growth during September, October and the first week of November. The beginning of shell hardening at the tip of the nut approximately separates the two periods. Endosperm growth begins 14 days and embryo growth 42 days after pollination. The cotyledons elongate into the lower portion of the ovule during the first half of September. The most important phase of pecan-nut filling is thickening of the cotyledons, which occurred in Maryland between the middle of September and harvest. The formation of plump, solid kernels depends upon the translocation of adequate quantities of food materials from the tree through the seed coats to the embryo during the last month of filling.

1270. SMITH, C. L. 634.521: 577.17
Effect of indole-3-butyric acid on transplanted pecan trees.
J. agric. Res., 1947, **74**: 187-92.
Relatively small amounts (8 mg. per tree) of indole-3-butyric acid, when applied to taproots of pecan trees at the time of transplanting, stimulates the processes of initiation of growth of new roots and of top growth, and, as a result, greater amounts of the stored nutrient materials are used up during the first growing season than in similar untreated trees.

1271. WHITEHOUSE, W. E., STONE, C. L., AND JONES, L. E. 634.574-1.541.11
Vigor of *Pistacia* seedling progenies during first season in nursery.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 137-40, bibl. 1.
Work at the U.S. Plant Introduction Garden, Chico, Calif., on nursery vigour of pistachio nut seedlings indicates that unless seedlings of *P. chinensis*, *P. terebinthus* and *P. atlantica* are particularly outstanding in drought resistance, compatibility or other important characteristic, their behaviour in the nursery rules them out of consideration as rootstocks for the pistachio nut. On the other hand interspecies crosses, in which *P. vera* was the female parent, produced seedlings of high vigour and good form, a high proportion of which could be budded the first season.

1272.
a BLOSSER, J. H., FRANKLIN, E. R., AND MUMFORD, D. C. 631.16: 634.7+635.64
Man labour requirements for cane fruits and tomatoes in the Willamette Valley, Oregon.
Stat. Bull. Ore. agric. Exp. Stat. **422**, 1944, pp. 32.
b GRAY, G. F. 634.75(766)
Strawberry culture and varieties.
Bull. Okla agric. Exp. Stat. **B-304**, 1947, pp. 28.
c TALBERT, T. J., AND HIBBARD, A. D. 634.75(778)
Growing strawberries in Missouri.
Circ. Mo. agric. Exp. Stat. **311**, 1947, pp. 19.
d WALDO, G. F., AND HARTMAN, H. 634.71(795)
Culture of trailing berries in Oregon. (Boysen, Young, Logan, cultivated Blackberries and others.)
Bull. Ore. agric. Exp. Stat. **441**, 1946, pp. 27.
e WALDO, G. F., AND HARTMAN, H. 634.75(795)
Strawberry production in Oregon.
Bull. Ore. agric. Exp. Stat. **442**, 1947, pp. 27.
f WALDO, G. F., AND HARTMAN, H. 634.711(795)
Raspberry culture in Oregon.
Bull. Ore. agric. Exp. Stat. **443**, 1947, pp. 31.

PLANT PROTECTION OF DECIDUOUS FRUITS.

1273. WALLACE, T. 632.19
Mineral deficiencies of plants.
J. Inst. Brew., 1946, **52**: 181-7, bibl. 5.
The history of plant nutritional investigations is outlined. The mineral nutrients are classified as (1) essential, (*a*) major and (*b*) minor, and (2) beneficial, aiding growth under special conditions. Deficiencies may arise from simple shortages or may be induced or intensified by other soil or weather conditions and by management practices. Methods of diagnosis and control are discussed.

1274. WALLACE, T. 632.19
Visual diagnosis of mineral deficiencies of plants.
Ann. appl. Biol., 1937, **34**: 146-7.
The basis of the visual method of diagnosing deficiencies in plants, its use in the field and its special uses are discussed. It is emphasized that this is not a hit and miss method to be used by those who are not prepared to study their crop plants in detail. Skill in it can only be acquired by intensive study and experience.

1275. NICHOLAS, D. J. D. 632.19
Chemical tissue tests.
Ann. appl. Biol., 1947, **34**: 148-52, bibl. 15.
Chemical tests for mineral deficiencies are of special value when visual symptoms are ill defined or complicated by drought, frost, fungi, insects, virus and a complex of nutrient disorders. They are discussed under 1. Technique (field sampling, preparation of test samples, extraction). 2. Chemical tests used. 3. Nutrient standards. 4. Diagnostic value. 5. Limitation of tissue tests. 6. Correlation with other diagnostic methods. 7. Visual diagnosis. 8. Full chemical analysis of the leaves. 9. Visual diagnosis. 10. Full chemical analysis of the leaves. 11. Soil data.

1276. ROACH, W. A. 632.19
The use of leaf analysis, plant injection and curative treatment for the determination of mineral deficiency in plants.
Ann. appl. Biol., 1947, **34**: 153-9.
An account of the plant injection experiments carried out by the author and his co-workers at the East Malling Research Station. [See *Tech. Comm. Imp. Bur. Hort.* 10 and 16, 1938; *H.A.*, 15: 529, 1683 and 2081.]

1277. THOMPSON, C. R. 634.1/2-2.19
Correcting deficiencies in fruit trees by inserting nutrient tablets.
Chem. Industr., 1946, No. 48, pp. 426-7.
In this paper read before the Agricultural Group on 22 January, 1946, the author gives a short, useful note of recent work on the subject by Wallace, Pizer, Furneaux and Roach and deals in a practical manner with equipment and insertion procedure. Noting that the methods have been proved most effective for correcting iron and manganese deficiencies and only slightly less effective against magnesium deficiency, he deals briefly with the possibilities of using an "omnibus pill" to cure borderline deficiencies in heavy cropping trees and ensure regular cropping. The fact that solid injections can affect the internal chemistry of trees suggests that increased resistance to pests and diseases might be achieved along these lines.

1278. BRENCHLEY, W. E. 631.811
The essential nature of certain minor elements for plant nutrition. II.*
Bot. Rev., 1947, **13**: 169-93, bibl. 173.
The author reviews recent work on boron, arsenic, copper, manganese, mercury, molybdenum, selenium and zinc; the fundamental role of these elements is unsolved. Recent

* Supplement to article *ibid.*, 1936, 2 : 173-96.

research has been practical, directed towards the improvement of crops by manuring with minor elements. Their indirect effects, ill or beneficial, on animal nutrition have been studied.

1279. ZIMMERMAN, M. 581.192: 631.811.6
Magnesium in plants.
Soil Sci., 1947, **63**: 1-12, bibl. 69.

This is a review of work carried out by the author and by many other workers on the role of magnesium in plants discussed with reference to (1) role in plant constituents and processes, (2) quantity of and need for magnesium in plants, and (3) magnesium absorption by plants as affected by other ions.

1280. EISENMENGER, W. S., AND KUCINSKI, K. J. 546.46: 631.811.6
Relationship of seed plant development to the need of magnesium.
Soil Sci., 1947, **63**: 13-17.

Families of seed plants in the lower stages of evolutionary development always show magnesium needs. Some of the intermediate families also show symptoms of magnesium deficiency. Among the extremely highly developed plants, only a few isolated members that may have been greatly changed by man through domestication and hybridization show the deficiencies, among them maize. Potatoes and one or more species of cucurbita, which do not belong to the most highly developed group but which are, nevertheless, fairly well developed plants, may also be included. There are factors other than the degree of evolutionary development of the plant which often determine the amount of chlorosis. Among these are age and the degree of storage of the ions within the plant. Thus, tubers, biennials or perennials, when planted for their second year (or in later years in the case of perennials), in a plot which is deficient in magnesium after growing in one which is not deficient, may show no deficiency for several years. Among such plants are the floral lilies, onions, strawberries, gladioli, peaches, iris, and others. Certain plants like the peach and the apple may show definite magnesium-deficiency symptoms when they are young but recover when their roots penetrate more deeply into the soil and find sufficient magnesium in the subsoil. It is significant that the more highly developed seed plants, because of their greater sturdiness, are far more resistant to abnormal agencies such as disease, extremes of temperature, and high or low concentrations of elements. In the course of the experiment described, thousands of plants were seeded directly in the field and thousands were transplanted. Many of these plants were lost by lack of germination, resistance to transplanting and lack of adaptability to new environment. But, for every one of the higher orders lost, approximately ten of the lower orders were lost.

1281. TRUOG, E., AND OTHERS. 631.811.6: 631.85
Magnesium-phosphorus relationships in plant nutrition.
Soil Sci., 1947, **63**: 19-25, bibl. 10.

The relation of the supply of available magnesium to the phosphorus content of peas (seed) was investigated by means of field and nutrient culture tests in which the supplies of available magnesium and phosphorus were varied. Chemical analysis of the pea seeds revealed an appreciable and consistent increase in phosphorus content with increasing supplies of available magnesium. In fact, increasing supplies of available magnesium increased the phosphorus content of the peas much more than did increasing supplies of available phosphorus. They also indicate the need for giving increased attention to the supplies of available magnesium in soils in order that the phosphorus present may be used effectively and crops of the highest nutritive value produced. Failure in many cases in the past to obtain crops of higher phosphorus content through the addition of phosphate fertilizer may well have been due to a lack of available magnesium. [Authors' summary.]

1282. COOPER, H. P., PADEN, W. R., AND GARMAN, W. H. 581.192: 631.811.6
Some factors influencing the availability of magnesium in soil and the magnesium content of certain crop plants.
Soil Sci., 1947, **63**: 27-41, bibl. 33.

Magnesium is a constituent of chlorophyll and is apparently an active agent in the synthesis of carbonaceous materials from carbon dioxide. It is more abundant in the parts of plants that are concerned with the vital processes such as seed and foliage than in roots and stems. Thus the total amount of magnesium in the soil and the amount available to plants under different conditions are of special importance to those who grow crops with a relatively high magnesium requirement. Chemical analyses of a large number of plants show a very close correlation between the normal electrode potential, which is a measure of ion activity, and the mineral content of plants. The partial exclusion or limiting of the strong calcium ion in seeds, tubers, roots and other tissue concerned with reproduction suggests that plants possess some exclusion mechanism which prevents the accumulation of large quantities of certain strong ions which might depress seedling plant growth. The relatively high content of magnesium and phosphorus in seeds suggests that magnesium may be the strongest cation which could be utilized in combination with phosphorus and give sufficient assimilation of phosphorus in the seed for normal growth of seedling plants. The magnesium content usually ranks third or fourth in quantity of metallic nutrients in plants. Crops containing a relatively large quantity of magnesium, such as potatoes, cotton, tobacco, tomatoes and other vegetables, often give a marked response, as indicated by yield, to applications of magnesium in mixed fertilizers.

1283. BOYNTON, D. 634.11-1.811.6
Magnesium nutrition of apple trees.
Soil Sci., 1947, **63**: 53-8, bibl. 18.

This review of the work that has been carried out on the magnesium nutrition of apple trees, in North America, New Zealand and England, discusses the visible symptoms of magnesium deficiency, chemical analysis, conditions affecting the occurrence of magnesium deficiency of apple trees and control measures. The first visible evidence of magnesium deficiency in apple trees is a fading between the large veins of the older leaves on some shoots or spurs. The faded areas may turn very pale yellow and remain so for some time, or they may scorch rapidly; in either case necrotic brown blotches develop from them. Some of the dead areas between veins may remain as separate islands surrounded by green tissue, but many of them tend to coalesce as they grow in size, and when they grow together at the leaf margin they may produce a marginal leaf scorch indistinguishable from that resulting from potassium deficiency in its later stages. When the magnesium content of mature apple leaves sampled in midsummer is above 0·40% MgO, trees rarely show magnesium deficiency symptoms. When the magnesium content is between 0·40 and 0·25% MgO, the leaf blotch symptoms may appear if other conditions favour their appearance. When the magnesium content falls below 0·25% MgO (0·15% Mg), leaf symptoms are likely to appear on some branches. Liberal applications of potassium fertilizers to trees on soils low in calcium and magnesium have been found to induce magnesium deficiency and/or to increase its severity. Nitrogen fertilizers seem in some degree to decrease the prevalence and severity of magnesium deficiency in apple orchards. There is some evidence that heavy rainfall during the growing season may favour the development of magnesium deficiency injury to apple leaves. Epsom salts, kieserite, salt water magnesia, magnesium carbonate, and dolomitic limestone have all caused improvement of trees suffering from magnesium deficiency. Dolomitic limestone has, in some instances, but not always, appeared to be slower

in action than the other materials. When the soil is acid and low in calcium the use of dolomitic limestone along with other magnesium carriers would appear to be advisable, but where calcium is already high and acidity low, dolomitic limestone, magnesium carbonate, and magnesium oxide probably should not be used. In either case potassium fertilizers should not be used unless there is direct evidence of potassium deficiency in the orchard, and a relatively high level of nitrogen should be maintained in the trees.

1284. Powers, W. L., and Bollen, W. B. 634.23-2.19
Control of cracking of fruit by rain.
Science, 1947, **105**: 334-5, bibl. 4.

Copper sulphate has given control of cracking in cherries in immersion tests and preliminary spraying tests indicate that its use as a spray, or dust, will check cracking of fruit due to rain. [From authors' summary.]

1285. Fikry, A. 634.25: 632.181
Water-table effects. V. Peach functional disorder.
Bull. tech. sci. Serv. Minist. Agric. Egypt **245,** 1947, pp. 42, bibl. 5.

In three of his earlier papers in this series the author has dealt with the harmful effects of high water tables on stone fruit in Egypt; see *Bull.* 141, *H.A.*, 4: 525; *Bull.* 154, *H.A.*, 6: 420; *Bull.* 181. The present paper, publication of which was delayed for 7 years, describes the so-called functional disorder of peaches, resulting in a considerable decline of peach area in Egypt. Affected trees have an unhealthy appearance, which becomes more marked from season to season and is associated with an increasingly large reduction in yield. Finally the trees die. That tree decline is not due to toxic substances in the inundation water is evident from chemical analysis of the soil and subsoil water. It is the asphyxiation of the roots and their subsequent disintegration which causes the death of the trees, even in the absence of detrimental salts. Trials carried out at Barrage and Dokki showed that the susceptibility to injury by a high water table differs greatly in the two rootstocks commonly used, Baladi peach and *Prunus davidiana*, the latter having proved resistant to the functional disorder in years of normal Nile floods. All the varieties tested were found to be equally susceptible to the trouble. As may be expected from the scientific diagnosis, watering or pruning of the trees during the flood period—treatments advocated by growers—failed to give a response. The remedies suggested as a result of this investigation are drainage, the use of *Prunus davidiana* as a rootstock, and planting on land with a low water table. The paper is supported by charts of the water table in different years for low, medium and high terraces, and by 19 photographic plates which, however, owing to poor reproduction, do not add to the evidence produced in the text.

1286. Bush, R. 634.1/7-2.111
Frost* and fruit.
Agriculture, 1946, **53**: 411-4.

The advice given in this popular, interesting article is, when possible, to avoid frost pockets or to get rid of them by arranging for the removal of obstructions to the passage of cold air, to plant frost-resistant varieties and to consider seriously whether orchard heating or overhead heating may or may not offer an economic solution.

1287. Hawke, E. L. 632.111
Thermal characteristics of a Hertfordshire frost-hollow.
Quart. J. roy. met. Soc., 1944, **70**: 22-48.
Frost hollows.
Weather, 1946, **1**: 41-5.

In the first paper the author gives a detailed summary of records of temperature over a 13-year period in the Hertfordshire Valley of Rickmansworth, some 12 miles north of the outskirts of London, altitude 180 ft., where the night climate closely resembles that of the Aberdeenshire plateau, about the coldest inhabited region of the British Isles. In the shorter, second paper frost hollows in general are discussed and in particular this valley and the famous small, deep valley which lies at a height of 4,200 ft. in the Alps 65 miles south-west of Vienna and is called the Gstettneralm doline. In the hollow of this Austrian valley the extreme minimum temperature for 3 successive winters were −54° F., −60° F. and −60° F., whereas over the same period the thermometer at the top of the Sonnblick, an Austrian mountain of 10,200 ft., never fell below −2° F. Rickmansworth shows some extraordinary diurnal ranges, that recorded for 6-7 July, 1941, being 50° F. As the author points out, it is no paradise for gardeners.

* See also 1165, 1166, 1172, 1226.

1288. Champion, D. L. 632.111
What is a ground frost ?
Weather, 1946, **1**: 186-8.

The present system in England is to record ground frosts as occurring when the temperature in the grass has fallen to 30° F. or below. It is here suggested that the best method of summarizing grass minima would be to tabulate all minima below 32° F. and then divide these between fixed limits, so defined as to cover crops of different susceptibility. If grass thermographs were installed, a more quantitative summary could be given, by expressing the number of hours of frost or, better, the number of hour-degrees of frost per day, week, month or season. Thus 4 degrees of frost for 5 hours would rank equivalently with 2 degrees for 10 hours, etc.

1289. Blake, M. A. 634.25-2.111
Some problems involved in securing an accurate measure of the cold resistance of dormant buds of different varieties of peaches.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 89-92, bibl. 4.

The author discusses the indications given by work at New Brunswick of the complexity of the problem and makes helpful suggestions based on that work.

1290. Day, W. R., and Peace, T. R. 632.111
Spring frosts with special reference to the frosts of May, 1935.
Bull. Forestry Commission London **18,** 2nd edition, 1946, pp. 111, bibl. 55, 2s. 6d.

The observations on trees and shrubs made in Great Britain after the devastating spring frosts of 1935 and the meteorological and other data collected still constitute a rich source of information, the conclusions drawn at the time having lost nothing of their validity. Although the bulletin concentrates on the silvicultural aspects of the problem, reports on the response of individual species to the May and June frosts of that year include many ornamental trees and shrubs, conveniently arranged in alphabetical order. The chapter on the nature of late frost injury (to leaves, young shoots, buds, old wood) and the recovery from that injury concerns the gardener as much as it does the forester. Equally, the chapters on the temperature of the ground air zone and factors affecting it and on the influence of topography on the incidence of frost command general interest. Unfortunately, the forester's relatively simple means of protecting susceptible younger trees against moderate frost, viz. by the provision of a sheltering canopy, seems to be inapplicable in horticulture. There are 12 plates with 2-3 photographic illustrations each. The bibliography includes references to papers published later than 1937, the date of publication of the first edition.

1291. Schulz, F. 634.1/8: 632.111(43)
Beitrag über die Auswirkung des Wurzelfrostes an Obstgehölzen im Winter 1941/42. **(The effect on fruit trees of the root-destructive frost of the 1941/42 winter.)**
Reprint from *Leistungssteigerung im Gartenbau*, Wiesbaden, Heft **1,** 1942 (?), pp. 16, bibl. 3 [received 1947].

In the fruit plantings of the Institut für Obstbau, Berlin University, it was observed that frosts damage the trees in different years at different places. The sudden December frost in 1938 hit the root collar worst, in 1939/40 stems and crotches sustained the chief injury, while the 1941/42 winter at first seemed to have left the trees unharmed, until later severe root damage became apparent. A rootstock trial, carried out in the grounds of the Institute and involving maiden trees of 10 apple varieties on 7 Malling rootstocks and 1 seedling rootstock, lent itself naturally to interesting comparative observations. Detailed diagrammatic and tabular presentation of the data shows differences in hardiness, both in rootstock and varieties. The following percentages of healthy trees were noted on the various rootstocks used: M. II, 12; IX, 20; V, 27; I, 30; seedling, 52; IV, 54; XI, 75; XVI, 83. It is pointed out that on this evidence alone, though confirmed by the experience of nursery men in the same year, M. XVI must not be pronounced the most frost-resistant of Malling rootstocks, since in earlier years it behaved differently. Neither is there any clear-cut relationship between susceptibility and vigour, the seedling being the most vigorous of the stocks. However, it may be said that II and IX are more susceptible than the rest. The percentage of healthy trees in the varieties ranged from 25 in Geh. Oldenburg to 65 and 67 in Allington Pippin and Cox's Orange, James Grieve and Beauty of Bath being intermediate with 42 and 43 respectively. Of 15 maiden peach trees (5 varieties) on clonal Ackermann plum rootstock, 9 scions were uninjured in the summer of 1942, 5 were slightly damaged and 1 killed, the respective figures for scions on myrobalan seedling being 1 healthy, 3 slightly damaged, 11 killed. On 100 Kroosje yellow rootstocks, budded in August, 1941, with 4 peach varieties, 39% of the scion buds developed satisfactorily, whereas on 100 Reine Claude rootstocks not one bud grew out. Observations made on the influence of the rootstock on frost hardiness in plums are summarized in *Merkbl. Inst. Obstbau Univ. Berlin* 7; *H.A.*, 17: 1202. The study shows that the rootstock effect, especially that on the response to climate and weather in the scion variety, must continue to receive full attention.

1292. BRANAS, J. 634.8-2.111
Des vignes détruites par le froid. (Grapevines destroyed by frost.)
Progr. agric. vitic., 1947, **127**: 123-6.

The severe frosts of the past winter caused great damage in French vineyards. The buds were destroyed first, but the injuries later extended to the shoots, branches and stems. The measures to be adopted in such cases vary with the damage caused. On pruned vines there is nothing to be done except wait until growth starts, when severe disbudding must be adopted to allow only a few of the buds to develop into new branches. On unpruned vines the branches should be cut back to sound wood, but it is advisable not to do this until the buds begin to develop, when it can be done more quickly.

1293. BROCKIE, W. B. 632.111: 58.006(931)
Snow damage in Christchurch botanic gardens.
J. roy. N.Z. Inst. Hort., 1946, **15**: 2: 7-8.

A graphic account of great damage caused to trees and shrubs by "the heaviest snowfall in the history of Christchurch", on 14 July, 1945.

1294. HUNT, N. R. 632.3/4: 632.8
Destructive plant diseases not yet established in North America.
Bot. Rev., 1946, **12**: 593-627, bibl. 170.

The destructiveness of plant diseases introduced into North America and already established there is pointed out. Such diseases cost millions of dollars a year for control, millions of man-hours in the production of the hosts whose usefulness they destroy, and incalculable losses in economic and other adjustments and in lost beauty in landscapes and gardens. The risks of introducing other diseases are now enhanced by the prospect of increased importations of foreign diseases with newly-gathered plant products transported by high-speed aircraft. The factors affecting the destructiveness of pathogens are discussed and many examples are given of destructive foreign diseases not yet found in North America.

1295. MILLER, P. W. 634.54-2.3/4
Diseases of the filbert in the Pacific Northwest and their control.
Stat. Bull. Ore. agric. Exp. Stat. **428**, 1945, pp. 24.

The rapid expansion of filbert growing in the Pacific Northwest in the past decade has been associated with an intensification of diseases. The most destructive of these is bacterial blight, caused by *Xanthomonas corylina*, with canker formation on the trunks of young trees as its most serious aspect. After the 4th year the trunk is seldom infected. Crop losses from bud and twig blight are usually not so severe, though in some orchards they have amounted to 25%. Contamination by pruning and suckering tools is prevented by disinfecting them in bichloride of mercury. One 6-3-100 bordeaux spray applied in August will achieve commercial control in a not too wet season. Mildew (*Phyllactinia corylea*), crown gall (*Agrobacterium tumefaciens*), mushroom root rot (*Armillaria mellea*) and several wood rotting fungi are also discussed. Sunscald is liable to occur when the temperature rises above 95° F., but damage can be prevented by covering the trunk with suitable materials. Cold injuries, too, can be lessened by protective covers or whitewashing. The need for proper orchard management is emphasized.

1296. MILLER, P. W., SCHUSTER, C. E., AND STEPHENSON, R. E. 634.51-2.3/4
Diseases of the walnut in the Pacific Northwest and their control.
Stat. Bull. Ore. agric. Exp. Stat. **435**, 1945, pp. 42.

In the Persian (English) walnut (*Juglans regia*) orchards of the Pacific Northwest walnut blight, caused by *Xanthomonas juglandis*, is the most widespread and destructive disease. Symptoms are pictured in detail and control measures are given as worked out in experiments over a 14-year period. Three to four 4-2-100 bordeaux applications plus 1 pt.-100 summer oil emulsion are recommended, the correct timing of which, even to the day, is necessary for success. The stages at which spraying should be carried out are illustrated, viz. early and late pre-blossom and early post-blossom; in wet seasons an additional application at the middle pre-blossom stage is advisable. In seedling walnut orchards, where variation in blossom time is unavoidable, exact timing constitutes a major problem. In a normal season 4 applications of a 20-40-10-2 copper-lime-sulphur-oil dust will also give commercial control. Other parasitic diseases discussed are: Mushroom root rot (*Armillaria mellea*), crown gall (*Agrobacterium tumefaciens*), ring spot (*Ascochyta juglandis*), downy leaf spot (*Microstroma juglandis*), and walnut blotch (*Gnomonia leptostyla* [imperfect stage: *Marssonina juglandis*]). The following physiological troubles are dealt with: Boron deficiency; walnut girdle or black line of grafted walnuts (probably due to incompatibility of hybrid black walnut rootstocks); cold injury; shrivel, sunburn and shell perforation of the nuts; zinc deficiency. Further, hail injury, woodpecker injury and the control of mosses and lichens are discussed. Cold injury is treated at some length. The severity of the damage can be mitigated if the trees are kept in a healthy condition, soil moisture and humus are conserved, late irrigation is avoided, and the collar and main roots are uncovered in summer as a precaution against *Armillaria* infection. Further aids are whitewashing of the trunks and heading the trees low. In general, disease incidence is reduced with proper orchard management, for which a minimum distance between trees of not less than 50 feet is imperative.

1297. Berkeley, G. H., and Chamberlain, G. C. 634.711-2.3/4+2.8
Diseases of the raspberry.
Publ. Dep. Agric. Canada **760**, 1947, pp. 11, being *Fmrs' Bull.* **123.**
This is a revised edition, with little change, of the bulletin previously noted (*H.A.*, 14: 1591).

1298. Anon. 634.2/8-1.544-2.95
Bestrijdingsschema voor fruit onder glass. **(Pest and disease control for fruit under glass.)**
Versl. PlZiekt. Dienst. Wageningen **107**, 1944, 21 pp.
General instructions, with illustrations, for controlling pests and diseases on fruit trees in greenhouses, with a spray calendar for grapes, and another for peaches and plums.

1299. Smith, K. M. 632.8
Virulence of viruses in plants.
J. gen. Microbiol., 1947, Vol. **1**, Proc., pp. v-vi.
Plant virus-host relations are discussed. Virulence can be increased in various ways. Growing the plants under conditions of high temperature and light intensity induces tobacco mosaic virus to kill *Nicotiana glutinosa* with a systemic necrosis. Site or method of entry of the virus may also influence virulence. Thus transmission of curly-top to tomatoes by grafting with scions from infected tobacco plants which have recovered from the symptoms induces a mild disease, but infecting tomato plants by leafhoppers feeding on the outside leaves induces a severe disease. Similarly *N. glutinosa* grafted with a scion of mosaic tobacco dies with systemic necrosis, but if inoculated with the same virus it develops only local lesions.

1300. Brown, G. G. 634.13-1.541.44
A method of topworking pear trees for early maximum production and for reducing stony pit losses.
Stat. Bull. Ore. agric. Exp. Stat. **438**, 1946, pp. 23, bibl. 2.
Pear trees seriously affected by stony pit virus disease should be topworked with a resistant variety, by means of buds or grafts throughout the framework with the minimum of surgery; in one tree 121 buds were used. Four years after treatment the trees yielded heavily.

1301. van Slogteren, E. 632.8
Serologische diagnostiek van virus-ziekten van land- en tuinbouwgewassen. **(The serological diagnosis of virus diseases of field and garden crops.)**
(*Publ.*) *Inst. Phytopath. Lab. Bloembollenonderz. Lisse* **78**, 1946, pp. 10, bibl. 8, reprinted from *Landbouwk. Tijdschr.*, 1946, **58**: 546-55.
A review of the subject, dealt with here more fully than in the paper already noted (*H.A.*, 16: 1884).

1302. Zeller, S. M., and Milbrath, J. A. 634.23-2.8
Mild rusty mottle of sweet cherry (*Prunus avium*).
Phytopathology, 1947, **37**: 77-84.
Mild rusty mottle of sweet cherry trees has been observed in Oregon for the last 6 or 7 years; it occurs also in parts of Idaho and Washington. The varieties of cherries observed appear to be about equally susceptible. From a distance one may distinguish trees affected with mild rusty mottle by their general yellowish greenness as compared with the dark green of healthy trees. The whole tree takes on a rusty or bronzed appearance by late June or early July. By graft inoculations the disease has been transferred to sweet and sour cherry, peach, flowering cherry and Italian prune. All the varieties of peach tested and Italian prune are symptomless carriers of the disease. The differences between the mild and severe forms of rusty mottle are pointed out. Since these two viruses are so distinct the common names, mild rusty mottle and severe rusty mottle, are proposed. Control is by using clean scion wood in the nurseries and roguing out affected trees in orchards.

1303. Blodgett, E. C. 634.25-2.8
Rusty spot of peach.
Phytopathology, 1947, **37**: 145-7.
The name rusty spot for this disease is suggested by the symptoms; the pubescence of portions of the young fruits eventually sloughs off, leaving unsightly bald patches of varying sizes. The pits from severely affected rusty-spot fruits are smaller and thinner than those of normal fruits, and the tips are curved toward the side of the severe rusty-spot area. The cause of the disorder is not yet determined, but results obtained indicate the danger of using bud wood from affected trees for propagation.

1304. Houston, B. R., Esau, K., and Hewitt, W. B. 634.8-2.8
The mode of vector feeding and the tissues involved in the transmission of Pierce's disease virus in grape and alfalfa.
Phytopathology, 1947, **37**: 247-54.
A study was made of the mode of vector feeding and the tissues involved in the transmission of Pierce's disease virus in grape and alfalfa, and of the feeding punctures of adults of *Draeculacephala minerva* Ball, *Helochara* sp., *Neokolla circellata* Baker, *Carneocephala fulgida* Nott., and nymphs of *D. minerva* and *N. circellata*. The virus multiplied and caused disease only when the vector reached the xylem tissue during feeding.

1305. Makarov-Kožuhov, L. N. 634.8-2.8
Anthracnose and court-noué of vine in the Crimea. [Russian.]
Proc. Lenin Acad. agric. U.S.S.R., 1946, No. 11-12, pp. 40-3, bibl. 7.
Reports on the presence of anthracnose of the grapevine in the Crimea are erroneous. The disease known as deformation anthracnose is in fact a virus disease, court-noué. Blotchy anthracnose does not occur in the Crimea. Court-noué causes serious losses in the Crimea; the various types of symptom are described in detail.

1306. Oxford, D. 632.3
Virulence of bacteria in plants.
J. gen. Microbiol., 1947, Vol. **1**, Proc., pp. i-ii, bibl. 8.
Various aspects of the subject are reviewed, and it is concluded that " It is most desirable that the information to be gained from such lines of approach should be collated, and strained analogies with certain aspects of bacterial disease in animals be avoided in order to obtain a true picture of the nature of virulence in plants ".

1307. Izrailjskiĭ, V. P. 577.17: 632.3
Growth-promoting substances and their rôle in bacterial tumour development.* [Russian.]
Adv. mod. Biol., 1947, **23**: 109-26, bibl. 61.
A review of the literature on the response of tumour-producing bacteria to growth-promoting substances with special reference to the root nodule bacteria of the *Leguminosae* (*Rhizobium radicicolum*) and the crown gall organism (*Bacterium tumefaciens*).

1308. Braun, A. C. 632.314
Thermal studies on the factors responsible for tumor initiation in crown gall.
Amer. J. Bot., 1947, **34**: 234-40, bibl. 6.
Continuing his study of crown gall bacteria, *Phytomonas tumefaciens*, using periwinkle (*Vinca rosea*) as host (see *H.A.*, 14: 576), the author incubated parts of the plant in glass tubes at 26° C. and 32° C., in various combinations for different periods. Normal host cells are not converted

*See also 1151

into tumour cells at 32° C.; but they are so changed if, after at least 2 days at 26° following inoculation, they are held at 32° C. Tumour initiation takes place between 1 and 2 days after inoculation.—Rockefeller Institute for Medical Research, Princeton, N.J.

1309. DE ROPP, R. S. 632.3: 633.854.78
The isolation and behavior of bacteria-free crown-gall tissue from primary galls of *Helianthus annuus*.
Phytopathology, 1947, **37**: 201-6.

Tissue isolated from crown galls on tobacco and tomato always contained viable organisms of *Phytomonas tumefaciens* in large numbers. The interior tissues of primary galls on sunflower were frequently free from bacteria and new strains of bacteria-free crown gall tissue could be obtained from such tissues. Tumour tissue obtained in this way was generally mixed with normal tissue and tended to throw out roots for some time. Two types of tumour tissue were isolated from the primary galls, a hard woody type and a soft translucent type. On prolonged culture the woody type tended to change into the soft type.

1310. RIKER, A. J. 632.3
Inoculations with bacteria causing plant disease.
Pure Cult. Stud. Bact., 1945, **13**: 1: 1-15, bibl. 32.

This new edition of Leaflet X may be regarded as well up to date. The text has been lengthened by nearly 2 pages.

1311. MIRZABEKJAN, R. O. 634.21-2.3
Bacterial wilt of apricots in the Armenian SSR. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1946, No. 5-6, pp. 44-8.

A disease of apricots in Armenia is attributed to bacterial infection. The symptoms appear in early spring at the time of blossoming or more particularly during the period when the leaf buds are unfolding. The affected organs lose their normal colour and the leaf margins become distorted and wrinkled. The leaves turn yellow and remain attached to the tree. In the first stage of the disease a delicate, white, slimy, sticky bloom appears on the leaves, but later this dries up and disappears. An organism isolated from infected tissues was used in inoculation experiments with positive results. Its cultural, biochemical and serological reactions show that it is distinct from any other organism causing disease in fruit trees, so it is named *Bacterium armeniaca*. The recommendations for control are (1) removal and burning all affected parts, (2) the uprooting and burning of dying trees, (3) spraying with 1% bordeaux mixture as the buds swell, and again, with bordeaux mixture at 0·75%, 10 to 12 days after the fall of the sepals.

1312. FOISTER, C. E. 551.51: 632.4
The relation of weather to fungus diseases of plants. II.
Bot. Rev., 1946, **12**: 548-91, bibl. 267.

A supplement to a previous article (*Bot. Rev.*, 1935, 1: 497-516). It reviews and discusses the advance in knowledge, since 1935, of the effect of weather on plant diseases, under the headings (1) Predisposing factors (production of means of dispersal, survival of fungi, spore dispersal), (2) Germination, (3) Disease initiation and epidemics, (4) Soil conditions and plant diseases, (5) Apparatus, and (6) Practical applications.

1313. CARLSON, R. F. 634.25-1.531.17
Treatment of peach seed with fungicides for increased germination and improved stand of peach seedlings in the nursery.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 105-13, bibl. 3.

Work done mainly at Geneva, N. York, showed that it is possible to increase both the germination of peach seeds and the seedling stand by treatment with certain fungicides, Fermate and Spergon proving particularly useful under the conditions of the experiment. The two methods used were (*a*) dusting the seeds with fungicide dusts or (*b*) soaking whole pits in aqueous solution of fungicide for 20 hours or immersing them in aqueous solution under partial vacuum for 30 minutes. The actual technique is described.

1314. HUTTON, K. E. 634.11-2.4
Trunk and limb cankers of coastal apple tree caused by *Dothiorella*.
Agric. Gaz. N.S.W., 1947, **58**: 92-4.

This disease caused by *Dothiorella* sp. has three distinct forms, viz. bark canker of limbs, wood infection following pin-hole borer attack, and trunk canker. No control measures can be recommended until more is known about the role of the borer as a possible carrier of wood infection and trunk canker. Neither can any measures be recommended for the bark canker except the cutting off of any diseased wood to a distance of 18 in. to 2 ft., where possible, below any obvious discoloration in the wood.

1315. SPOOR, P. A. 632.42: 634.11 +634.13
Schurftbestrijdingsproeven op de Zuidhollandsche Eilanden 1941 t/m 1944. **(Experiments for the control of fruit scab.)** [English summary.]
Meded. Direct. Tuinb., 1947, **10**: 25-30.

Experiments were carried out in South Holland during 1941-44 to compare the results of spraying against apple and pear scab according to (1) the stage of development of the ascospores, (2) the stage of the development of the buds. The results varied from year to year and neither method can be recommended as better than the other. Less satisfactory was the Swiss method of spraying early (as the buds begin to swell) with strong bordeaux mixture (5%).

1316. MANNS, T. F., AND OTHERS. 634.11-2.42
Spray experiments with organic fungicides for the control of apple scab.
60th Trans. Peninsula hort. Soc., 1946, in *Bull. Delaware St. Bd Agric.* **36**: 5: 85-9.

The most promising was Puratized N 5E. The addition of DDT had on the whole a deleterious effect on the fungicidal action of the compounds tested. The following showed certain objectionable traits which limit their usefulness: Isothan Q-15, Phygon, Dithane D-14.

1317. GILLIVER, J. 632.42
The effect of plant extracts on the germination of the conidia of *Venturia inaequalis*.
Ann. appl. Biol., 1947, **34**: 136-43, bibl. 3.

Of 1915 flowering plants 23% gave extracts which completely inhibited the germination of the conidia of *Venturia inaequalis* under the experimental conditions used. The plants which gave active extracts are distributed throughout the angiosperms, and there is no correlation with systematic position. The inhibitors were distributed generally in some plants and were localized in others, e.g. in the leaves. Some extracts appeared merely to inhibit the germination of the conidia while others killed them. Some inhibitors disappeared when the plants were dried, other dry material was still active when re-tested several months later. *Hedera helix* contains an inhibitor which is active when the extract is diluted 128 times.—Sir W. Dunn, School of Pathology, Oxford.

1318. CUNNINGHAM, G. H. 634.1/2-2.47
Cause and prevention of silver leaf in orchards.
N.Z. J. Agric., 1947, **74**: 137-9.

Silver leaf is widespread in orchards throughout New Zealand, being common on almonds, apples, apricots, cherries, currants, gooseberries, nectarines, peaches, pears, plums and quinces as well as on many ornamental shrubs and trees. It has not been found on indigenous plants. The symptoms of the disease and the causal organism (*Stereum purpureum*) are described. The most efficient wound covering for protection against infection has proved to be bitumen paint, which provides an excellent cover and does not damage bark or wood.

1319. VIDAL, —., AND LAFON, J. 634.8-2.952
Sur un mode d'épandage automatique de solutions cupriques contre le mildiou de la vigne exactement aux moments opportuns. (The automatic dispersal of solutions of copper against vine mildew at the right time.)
C.R. Acad. Agric. Fr., 1947, **33**: 138-9.

The authors describe a method of impregnating cords with copper compounds and placing them over the parts liable to infection in such a way that the fungicide is dispersed in small amounts by rain. In one case a vine arbour was effectively kept free from mildew until the fruit was gathered, by placing over it a large-meshed net impregnated with copper salts. Where such a method is not feasible, ropes (8-10 mm. in diameter and made of coarse fibres) may be used, each being placed at 30 cm. (about 1 foot) above the organs to be protected. The dispersion extends to about 20 cm. on each side. The best results so far obtained have been with acetate of copper for ropes and concentrated bordeaux mixture for netting.

1320. WALDO, G. F., AND OTHERS. 634.75-2.411
Breeding strawberries for resistance to red-stele root disease.
60th Trans. Peninsula hort. Soc., 1946, in *Bull. Delaware St. Bd Agric.* **36**: 5: 22-33, bibl. 4.

Breeding to obtain resistance to red-stele was begun by the U.S. Dep. Agric. in 1937 at Beltsville, Md. Resulting seedlings are now being tested and selected both at Beltsville and at Corvallis, Oregon, and tables show the resistance achieved. Growing seedlings in fields in infected soil as well as in small pots in the greenhouse and infecting the soil with cultures of the disease produced good results, including a highly resistant variety, Temple. It was also found possible to test the resistance of large numbers of seedlings of known parentage relatively quickly by a greenhouse bench test in mid-winter. Some selections at first deemed fully resistant later took the disease. Some selections of *Fragaria chiloensis* seem to have resistance.

1321. JEFFERS, W. F. 634.75-2.411
Performance of the red stele-resistant Temple strawberry in Maryland during the 1946 season. 60th Trans. Peninsula hort. Soc., 1946, in *Bull. Delaware St. Bd Agric.*, **36**: 5: 33-7.

A description of a strawberry variety introduced as the result of a co-operative strawberry breeding project between the University of Maryland and the U.S. Dep. Agriculture. Formerly known as 84-AF it is now called Temple. Reactions of growers have been very favourable. It is very resistant to red-stele, is not so acid as Blakemore, but it is firm. It is not so sweet or dark as Fairfax. It likes moist, fertile soil. Early autumn manuring appears preferable to spring applications.

1322. JUGANOVA, O. N. (YOUGANOWA, O. N.). 634.21-2.48
Grey rot of apricot (*Monilia*) and its control. [Russian.]
(*Publ.*) *Crimean Res. Inst. Plant. Prot.*, 1946, 71 pp., bibl. 36.

The "grey rot" (brown rot) of the apricot caused by *Monilia cinerea* (*Sclerotinia laxa*) is a very serious disease in the southern regions of European Russia, particularly in the Crimea. It attacks all parts of the tree—buds, flowers, fruit, twigs and stems. Until quite recently the control measures recommended were inadequate. Experiments carried out by the author in the laboratory and in the field show that satisfactory control can be obtained by the use of copper naphthanate in an oil emulsion. The recommendations are: (1) Spray with 6% emulsion containing 0·6% copper naphthanate in the pre-winter period (30-40 days after leaf-fall), (2) Use the same spray in early spring up to the time the buds begin to swell, (3) Spray with 3% emulsion containing 0·3% copper naphthanate just before bud-burst, (4) Spray with 1% emulsion containing 0·1% naphthanate at petal-fall, (5) Control insect pests, (6) Cut out and burn all infected branches.

1323. ASSOCIATION OF APPLIED BIOLOGISTS. 595.7(410)+632.6/7(410)
***Common names of British insect and other pests.* Part I.**
The Mendip Press Ltd., Bath, 1947, pp. 30, 2s.

A list of insect pests corresponding to the List of Common British Plant Diseases (see *H.A.*, 15: 364) has long been awaited by research and advisory workers in agriculture and horticulture. That a start has been made with the present publication will meet with general approval. It consists of lists of slugs and snails, eelworms, beetles, ants, bees, ichneumons, sawflies, wasps, etc., and flies, each in two parts, the first giving the scientific names in alphabetical order with their corresponding common names, the second the common names in alphabetical order with their corresponding scientific names.

1324. ROSS, W. A. 632.654.2: 634.11
Control of European red mite on apples.
Processed Publ. Dep. Agric. Canada, Div. Ent., **61**, 1947, pp. 3.

The special sprays mentioned for red spider control on apples include ammonia-DNOCHP (dinitro-ortho-cyclohexyl-phenol), which is recommended tentatively for trial by growers. It may be combined with sulphur and lead arsenate or with lead arsenate alone, but must not be used with any spray containing lime. The preparation is as follows: To 2 fluid oz. of commercial ammonia add water to make up 1-1½ pt. Into the liquid pour slowly, with constant stirring, 5 oz. 100% DNOCHP powder, and keep stirring for a few minutes. This concentrate is sufficient for 100 gallons of spray and may be mixed 1-2 hours or immediately before being added to the tank.

1325. NEWCOMER, E. J., AND DEAN, F. P. 632.654.2
Effect of xanthone, DDT, and other insecticides on the Pacific mite.
J. econ. Ent., 1946, **39**: 783-6, bibl. 3.

If DDT were used to control codling moth on apples in Washington, where the Pacific mite is prevalent, the latter would have to be controlled; it could be done by adding xanthone after the second cover spray—earlier application would russet the fruit of Jonathan and of yellow varieties.

1326. GREENSLADE, R. M., AND GOSCOMBE, E. G. 632.951
Addition of dinitro compounds to D.D.T. to prevent outbreak of spider mites.
Nature, 1947, **159**: 843-4.

Spraying trials against codling moth were carried out in South Africa during the 1946-47 season at Elgin, Cape Province, in collaboration with the Western Province Fruit Research Station, Stellenbosch. By the end of December, after 5 sprays, a heavy outbreak of the mite *Bryobia praetiosa* was evident on the trees sprayed with two DDT preparations. In the period January to the beginning of February, 3 further DDT sprays were applied, to which on one-half of the plot dinitro-*ortho*-*cyclo*hexylphenol was added in the form of its di*cyclo*hexylamine salt at 0·00625%. On 17 February the sprays containing the dinitro compound had reduced the total spider population per 16 leaves to 32 and 26 respectively, as compared with 644 and 768 present on trees treated with DDT emulsion and DDT dispersible powder only. It is emphasized that the incorporation of the dinitro compound proved effective even after an outbreak of red spider had started. The addition of the dinitro compound to a fixed nicotine spray was less satisfactory, and an explanation for this is advanced.

1327. TUNBLAD, B. 632.654.2
En ny typ av bekämpningsmedel mot spinnkvalster. (**A new type of preparation for the control of [glasshouse] red spider.**)
Växtskyddsnotiser, 1946, No. 6, pp. 94-5.
Since the war the Swedish market has been inundated with foreign brands of recently-developed insecticides, and the Plant Protection Station, Stockholm, is busy testing them and selecting the most useful. The present paper deals with the British preparation, Dynone, which these Swedish trials indicate as being satisfactory for the control of glasshouse red spider. Growers are asked to report their experiences with this chemical.

1328. FAYETTE, L. J., HENSILL, G. S., and CASSIL, C. C. 632.654.2: 632.951
Hexaethyl tetraphosphate for control of mites.
J. econ. Ent., 1946, **39**: 812, bibl. 1.
The two-spotted mite, *Tetranychus bimaculatus*, on roses, was controlled by two aqueous sprays (1 : 1,600), with 11 days between to allow for new hatching.—San Pablo, Calif.

1329. BARON, C. 632.654.2: 634.22
Apparition d'oribatides dans les vergers de pruniers de la région namuroise. (**A beetle-mite in the plum plantations round Namur.**)
Parasitica, 1945, **1**: 76.
The occurrence is recorded of a beetle mite in large numbers on 2-year-old branches of plum trees. The role of beetle mites is not yet well understood: they are generally considered as harmless. Their eggs are destroyed by winter spraying with anthracene oils.

1330. NEWCOMER, E. J., DEAN, F. P., AND CARLSON, F. W. 634.11-2.753
Effect of DDT, xanthone, and nicotine bentonite on the woolly apple aphid.
J. econ. Ent., 1946, **39**: 674-6, bibl. 2.
The use of DDT against codling moth on apples in the Pacific Northwest for one season has led to greatly increased infestation by the woolly apple aphid, *Eriosoma lanigerum* (formerly a serious pest) by interfering with the parasite, *Aphelinus mali*. Spraying with xanthone minimizes infestation; nicotine bentonite reduces it.

1331. NEWTON, J. H., AND LIST, G. M. 634.25-2.753
DDT to control the green peach aphis.
J. econ. Ent., 1946, **39**: 661, bibl. 2.
An autumn spray of 0·8 lb. DDT/100 gal. water applied to peach trees in Colorado led to greatly increased infestation of buds the following spring.

1332. BORG, Å. 632.753
Om några "vätningsmedels" effekt på blodlusens vaxskikt. (**The effect of certain wetting agents on the wax coat of woolly aphid.**)
Växtskyddsnotiser, 1947, No. 1, pp. 9-12.
Soap solution, 2%, and alcohol, 55%, were found to be much better wetting agents for the wax coats of woolly aphid than were commercial spreaders. However, soap is rationed in Sweden, and the cost of alcohol is prohibitive. Hence, the commercial preparations must suffice.

1333. MUNDINGER, F. G. 634.75-2.75
The control of spittle insects in strawberry plantings.
J. econ. Ent., 1946, **39**: 299-305, bibl. 4, being *J. Pap.* **668**, *N. York St. agric. Exp. Stat.*
Philaenus leucopthalmus may be destructive to strawberries. In New York State, eggs hatch during April and May and, after 5 instars, adults begin to emerge in July; oviposition occurs chiefly in September and October. The following controls are effective: 1% rotenone dusted at 50 lb./acre; 15 lb. derris + spreader sprayed in 300 gall. water/acre; 5% DDT dusted at 43 lb./acre; hydrated lime, 500 lb./acre. Control measures should be applied as soon as most of the eggs have hatched.

1334. MICHELBACHER, A. E., SWANSON, C., AND MIDDLEKAUFF, W. W. 634.51-2.752
Increase in the population of *Lecanium pruinosum* on English walnuts following applications of DDT sprays.
J. econ. Ent., 1946, **39**: 812-3.
DDT spray gave good control of codling moth and walnut aphid (*Chromaphis juglandicola*); but mites and frosted scales (*Lecanium pruinosum*) increased considerably. Both effects were more marked where commercial blocks had been sprayed, than with single trees.—Linden, Calif.

1335. DEAN, R. W., AND CHAPMAN, P. J. 634.11-2.75
Biology and control of the apple redbug.
Bull. N. York St. agric. Exp. Stat. **716**, 1946, pp. 42, bibl. 20.
The apple redbug, *Lygidea mendax*, occurs in many New York State orchards and may cause extensive damage (in extreme cases three-fourths of the crop) by gnarling and russeting the fruit. Control is effected by "(*a*) a petroleum oil spray applied during the dormant or delayed dormant periods, or (*b*) a contact spray or dust applied at the calyx stage or within 5 days of the calyx period. The dormant oil spray should contain 4% of a paraffinic base oil; the delayed dormant, 3% of a highly paraffinic product. Blood albumin, 2 oz. in 100 gallons of water, or its equivalent in oil-depositing properties, is advised as the emulsifier for dormant sprays, and bordeaux mixture 2-4-100 for the delayed dormant. Nicotine sulfate, used at the rate of 1 pint in 100 gallons in the calyx spray, is the standard recommendation for controlling the pest in the nymphal stage. Two per cent. nicotine-lime dust and dusts containing 0·15 to 0·2% pyrethrins gave excellent control when applied within 5 days after the calyx stage". The biology of the insect is discussed.

1336. SNAPP, O. I. 634.25-2.754
Experiments in 1946 on the control of bugs that cause deformed peaches.
J. econ. Ent., 1947, **40**: 135-6, bibl. 1.
Two applications of DDT (1 lb./100 g. spray) at petal fall and shuck off, reduced deformed peach incidence from 40% to 6·2%. Sabadilla was ineffective, benzene hexachloride at full bloom was promising and did not affect flavour. Earlier work was reported in *J. econ. Ent.*, 1946, 39: 41-3; *H.A.*, 16: 1914.

1337. ROSS, W. A., AND PUTMAN, W. L. 634.25: 632.753/4
Bugs causing scarring of peaches.
Processed Publ. Dep. Agric. Canada, Div. Ent. **43**, 1946, pp. 3.
(1) Oak and hickory plant bugs: for control remove oaks and hickories within 200 yards or spray in June with hydrated lime plus sulphur. (2) Tarnished plant bug: do not cut weeds until after thinning. (3) Green stinkbug: remove host trees from immediate vicinity of peaches. The symptoms are illustrated.

1338. HARTZELL, F. Z. 634.8: 632.754
Methods of estimating foliage area injured by grape leafhoppers.
Tech. Bull. N. York St. agric. Exp. Stat. **277**, 1946, pp. 49, bibl. 25.
In New York, where vine growing is a major fruit industry, second only to apple, leafhoppers (chiefly *Erythroneura comes comes*) infest all varieties of grapes throughout the State. When the pest is abundant, fruit quality and size of the crop in the following year may be seriously affected. On the other hand, a light infestation does not cause sufficient damage to warrant control measures. In order to determine when treatment may be necessary this investigation was carried out, involving a study of the relationship

between the degree of leaf injury by these insects and fruit quality. Two methods of estimating the injured leaf area were evolved and designated as " square " and " matching " methods, both of which are discussed in detail.

1339. Jones, P. R., Glover, L. C., and Hansberry, R. 634.8-2.754
An oil-DDT vapor spray to control grape leafhopper.
J. econ. Ent., 1946, **39**: 770-4.
Concentrations of 0·6, 1·2 and 2·4 lb. DDT were applied to vines in vapour sprays at 3-5 gal./a. before bloom. In most cases 99% control of adult leafhoppers was achieved, and the population remained low for 30 to 90 days. DDT did not damage foliage; there was no subsequent effect on lady-bug beetles, Willimette mites or *Anagrus epos*. Fruit sprayed at the buckshot stage showed a maximum residue of 5·8 p.p.m. DDT at harvest.—San Joaquin, Calif. and Arizona.

1340. Manson, G. F. 632.754: 634.8
The grape leafhopper on Virginia creeper.
Processed Publ. Dep. Agric. Canada Div. Ent. **35**, 1946, pp. 4.
The grape leafhopper, *Erythroneura comes*, is the most destructive pest of Virginia creeper, *Parthenocissus quinquefolia*, in the Canadian prairie area. As a result of the feeding the leaves turn white and drop from the vines, and in severe cases the vines may be bare of leaves by August. Plants attacked by the pest, other than Virginia creeper and grape, include apple, plum, currant, gooseberry, raspberry and dahlia. For control, have a thorough clean up of leaves and trash in the vicinity of Virginia creeper plantings, and dust or spray with DDT.

1341. Pierre, F., and Marijon, G. 632.76: 634.1/2
Premières notes sur l'évolution du *Capnodis tenebrionis* L. et l'efficacité d'une nouvelle méthode de lutte. **(The evolution of *Capnodis tenebrionis* L. and a new method of control.)**
C.R. Acad. Agric. Fr., 1947, **33**: 38-42.
The larvae of the wood-boring beetle, *Capnodis tenebrionis*, attack most plantation fruit trees except citrus. Apricot, peach, plum, cherry and almond are apparently preferred, but apple, pear and *Pyrus japonica* are also attacked and so are certain woodland trees such as the bullace (*Prunus insititia*). The biology of the beetle has been under observation with reference to the duration of the larval stage, the habits of the larvae and their distribution in the soil in relation to attacked trees. A method of control recommended is to inject methyl bromide into the soil at the rate of 15-20 g. per tree, at four points at a depth of 15 cm.

1342. Taylor, J. S. 634.63-2.76
Notes on the olive beetle (*Argopistes sexvittatus* Bryant).
Reprinted from *J. ent. Soc. S. Afr.*, 1945, **8**: 49-52, bibl. 5.
The beetle is a pest of cultivated olive in Groaff-Reinet. For its control 4 applications of a lead arsenate spray (4 lb. in 100 gal. + ½ lb. spreader) are recommended between harvesting and blossoming at intervals of a month to 6 weeks. The life history of the pest is discussed.

1343. Nickels, C. B., and Pierce, W. C. 634.521-2.76
Effect of lead arsenate sprays on the pecan weevil and other pecan insects.
J. econ. Ent., 1946, **39**: 792-4.
Pecan nuts sprayed thrice in September with lead arsenate, lime and zinc sulphate showed some reduction in injury by the pecan weevil; this treatment reduced the overwintering population of the pecan nut casebearer, but may lead to a large increase in the aphid population (*Monellia* sp.).—Texas.

1344. Richardson, C. H. 634.11-2.768
DDT for control of the apple curculio.
J. econ. Ent., 1946, **39**: 331.
On apples sprayed with DDT or lead arsenate for codling moth control, very little damage could be ascribed to the apple curculio, *Tachypterellus quadrigibbus magnus*.—Mitchellville, Iowa.

1345. Maxwell, C. W. B. 634.75: 632.768
Control of the strawberry weevil—a destructive pest of strawberries and raspberries.
Processed Publ. Dep. Agric. Canada Div. Ent. **66**, 1947, pp. 4.
The habits of the strawberry weevil (*Anthonomus signatus* Say) and the damage it causes are outlined, and control measures are described. One application of a mixture of 30 parts synthetic cryolite and 70 parts gypsum, applied as a dust as soon as bud cutting begins, is very effective. Two disadvantages of this mixture are that it is washed off readily by rains, and that the carrier, gypsum, becomes lumpy in standing over one season. DDT is very effective against this weevil as a 3% dust or as a spray containing the wettable powder in water. If the wettable powder contains 50% DDT it may be used at the rate of 1 lb. of powder to 40 gal. water or 4-4-40 bordeaux.

1346. Chandler, S. C. 634.22-2.768
Unsatisfactory control of plum curculio in Illinois with dichloroethyl ether.
J. econ. Ent., 1946, **39**: 666-7.
Control was inferior to that reported by O. I. Snapp for Georgia (*H.A.*, 16: 1930; *J. econ. Ent.*, 1945, 33: 417-8). This may be due to the grass cover, or the compactness of the soil, preventing penetration of the chemical.

1347. Riva Ferré, J. 634.63-2.77
Lucha química contra la mosca del olivo. **(Chemical control of the olive fly.)**
Rev. B.A.P., 1947, **30**: 351: 22-32.
The author reviews the life history of, and the damage done to olives by, the olive fly, *Dacus oleae*, and gives recommendations for its control. These are a modification of the measures adopted in Italy and consist of spraying, several times during the season, with a solution of anhydrous arsenate of soda (60% arsenic anhydride) 150-200 g., beet sugar 1 kg., water 100 litres, spraying the south side of the tree only.

1348. Stofberg, F. J. 588.427: 632.77
Melon-fly as a pest of granadillas.
Fmg S. Afr., 1946, **21**: 794-6, 824.
After considerable losses had been caused by an unknown insect to granadilla growers in the Transvaal low veld for several years past, the author observed a melon fly laying eggs on a young granadilla fruit. When the typical spots around the sting developed and systematic experiments were carried out, it became clear that the melon fly (several *Dacus* spp.), and possibly several fruit flies, are responsible for the damage. The pests are controlled by applying to the foliage once a week and after every good rain, a poisoned bait consisting of sodium fluosilicate 1 oz., white sugar 2 lb., water 4 gal. The crop should be grown on a site well removed from any cucurbits. Since the symptoms produced by the insects may be confused with leaf and fruit spot disease caused by a *Macrosporium* species, both types are illustrated. The fungus disease, which occurs on mature fruits only, is controlled with bordeaux.—Subtropical Horticultural Research Station, Nelspruit.

1349. van den Bruel, W. E. 632.78
Note sur le comportement de *Cydia* (*Carpocapsa*) *pomonella* Linn. dans la région de Gembloux. **(The behaviour of the codling moth round Gembloux.)** [Dutch, German and English summaries.]
Bull. Inst. agron. Gembloux, 1943, **12**: 42-56.

Hibernating larvae begin to pupate in April, and adults emerge from the middle of May over 5-6 weeks; weather may delay these phases 3-4 weeks. A few of the summer caterpillars pupate at once, producing adults in August. Between these two generations, moths may emerge from infested fruit in cool stores. The possibility of concerted attacks on codling moths is discussed.

1350. Švecova, A. N. 634.11-2.78
Procumbent apple trees—a form less susceptible to injury by *Laspeyresia pomonella* L. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1947, No. 1, pp. 34-7.

Apple trees trained to have a procumbent habit (see *H.A.*, 8: 1993), with the crown just above ground level and forming a layer 30-35 cm. high, were found to be far less severely attacked by codling moth than bush trees. In one trial damaged fruit on bush trees were 21·5%, on the procumbent trees 0·61%. The codling moth, when egg-laying, avoids the procumbent trees, the microclimate of which is characterized by relatively high air temperatures in summer and a noticeable deficiency of moisture on clear sunny days.

1351. Dean, F. P., Newcomer, E. J., and Westlake, W. E. 632.78: 632.951
Cryolite for codling moth control in the Pacific Northwest.
J. econ. Ent., 1946, **39**: 522-6, bibl. 3.

In dry conditions 3 lb. cryolite/100 gal. spray with emulsified mineral oil and a spreader gave as good control of codling moth on apples as did lead arsenate. Jonathans were slightly reduced in size, Rome, Delicious and Winesap were unaffected.

1352. Richardson, C. H. 632.78: 632.951
DDT for codling moth control.
J. econ. Ent., 1946, **39**: 391-3, bibl. 5.

Seven cover sprays of DDT (5 at 1 lb./100 gal., 1 at 0·75 lb., and the last at 0·33 lb. with 3 lb. lead arsenate) held a moderate infestation to 7·6% damaged fruit; control plots, sprayed six times with 4 lb. lead arsenate and then once with 0·33 lb. DDT, gave 35·8% damaged fruits. Most of the sprays included a fungicide. When the infestation was established in the lead arsenate series, the addition of 0·25-0·33 lb. DDT to the last three cover sprays failed to control it. Aphids, leafhoppers and mites did not increase on plots sprayed with DDT.—Mitchellville, Iowa.

1353. Peterson, P. D. 632.951: 634.11 + 634.25
Field experiments with DDT and BHC sprays on apple and peach in 1946.
60th Trans. Peninsula hort. Soc., 1946, in *Bull. Delaware St. Bd Agric.*, **36**: 5: 82-5.

DDT, while most effective against codling, is not a substitute for thorough spraying at the right time. Of apple pests not controlled by DDT, red mite, red banded leaf-roller, curculio and woolly aphid were the most noticeable. Methods of dealing with these are discussed. Peaches sprayed with BHC (benzene hexachloride) as a substitute for lead arsenate in 1946 showed no spray injury. Used at 7- to 10-day intervals in a 4-application schedule, it was consistently better than lead arsenate in controlling curculio during the period of its application. Its continued use was found essential so long as curculio was emerging.

1354. Jaynes, H. A., and Marucci, P. E. 632.78: 632.96: 632.95
Effect of artificial control practices on the parasites and predators of the codling moth.
J. econ. Ent., 1947, **40**: 9-25, bibl. 1.

The effect was studied by comparing populations and parasitization during 1938-40 in two orchards, one devoted to the study of biological control, the other a commercial orchard; only the second received cover sprays of lead arsenate or nicotine, etc. In general, these sprays adversely affect the codling moth's natural enemies, which were less numerous in the commercial orchard.—West Virginia.

1355. van Marle, G. S. 634.2-2.78
Boorders in *Prunus*. **(Prunus wood borers.)**
Tuinbouw, 1947, **2**: 149-52.

Prunus triloba plena is subject to attacks by wood borers, particularly the larvae of *Grapholitha woeberiana* but also sometimes those of *Alabonia bractella*. Notes on the habits and life history of *G. woeberiana* are given and reference is made to its parasite, *Omorgus difformis*. Recommendations for control are to spray twice with 2·5% Gesarol on the first appearance of the adult moths and four weeks later.

1356. Fulton, B. B. 634.73-2.78
Dusting blueberries to control the cranberry fruitworm.
J. econ. Ent., 1946, **39**: 306-8, bibl. 4, being *J. Pap. N.C. Agric. Exp. Stat.* **235**.

Dusting blueberries with a mixture of cryolite 70%, sulphur 10%, talc 20%, or with 3% DDT, greatly reduced the proportion of withered berries; the slight injury to the crop did not lower its market value.

1357. Rosella, E. 634.22-2.793
Le ver cordonnier est l'ennemi No. 1 du prunier.
(The sawfly as plum enemy No. 1.)
Progr. agric. vitic., 1947, **127**: 85-6.

A short note on the damage caused by the plum sawfly and on control obtained by the use of quassia, rotenone, 666 or sulphide of polychlorocyclane (S.P.C.). The necessity for applying the preparation as soon as the petals have fallen is stressed.

1358. Braid, K. W. 632.954
Bracken eradication.
Agriculture, 1947, **54**: 112-5, bibl. 7.

By (1) slashing, cutting and bruising machines, (2) ploughing, (3) trampling, (4) chemicals, or by a combination thereof. Methods of utilization of bracken are varied, but on the whole uneconomical.

1359. Anon. 632.954
Biological control of St. John's Wort.
Agric. Gaz. N.S.W., 1947, **58**: 11.

A short note on the spectacular results achieved in the campaign against St. John's Wort in the Ovens Valley through the release of the root-borer, *Agrillus hyperici*, and two leaf-eating beetles, *Chrysolina hyperici* and *C. gemellata*.

1360. Kraus, E. J., and Mitchell, J. W. 577.17: 632.954
Growth-regulating substances as herbicides.
Bot. Gaz., 1947, **108**: 301-50, bibl. 20.

The 2,4-dichlorophenoxyacetic, 2,4,5-trichlorophenoxyacetic and 4-chlorophenoxyacetic acids proved extremely toxic when applied under greenhouse conditions to the aerial parts of sugar-beet, radish, rape, kidney bean, red clover, and buckwheat plants. Other substances were toxic to plants or modified their growth when sprayed on the plants as lanolin or oil emulsions or when used as aerosols. The concentrations of these agents required to kill or markedly to reduce the rate of growth of the plants were from 0·13% to 1·0% when applied as emulsions. Dusts containing growth-regulating substances were relatively ineffective in these tests.

1361. Hayes, L. E. 632.3
Survey of higher plants for presence of antibacterial substances.
Bot. Gaz., 1947, **108**: 408-13.

Water extracts of 18 out of 231 species of higher plants tested showed definite antibactericidal properties. Of the four species of bacteria used two were plant parasites, viz. *Erwinia carotovora* and *Phytomonas tumefaciens*.

1362. MELIN, E., WIKÉN, T., AND ÖBLOM, K. 632.3
Antibiotic agents in the substrates from cultures of the genus *Marasmius*.
Nature, 1947, **159**: 840-1, bibl. 6.
Marasmius graminum and *M. ramealis* were found to be highly active producers of antibacterial agents. The antibiotic action of *M. foetidus* and *M. scorodonius* against *Staphylococcus* was also remarkable.—University of Uppsala, Sweden.

1363. COOK, A. H., AND OTHERS. 632.4: 632.3
Production of antibiotics by *Fusaria*.
Nature, 1947, **160**: 31-2, bibl. 2.
According to their production of antibiotics the *Fusaria* are divided into 4 groups, 3 of which are active against *Mycobacterium phlei* and may therefore possibly be active against *M. tuberculosis*.—Imperial College of Science and Technology, London.

1364. AUDUS, L. J., AND QUASTEL, J. H. 632.952: 577.17
Coumarin as a selective phytocidal agent.
Nature, 1947, **159**: 320-4, bibl. 14.
Coumarin was shown to possess phytocidal activities similar to those of 2,4-D and other agents of the heteroauxin class. At a concentration of the order of 10 p.p.m. the compound has a marked inhibiting effect both on germination and on subsequent root growth. The action of coumarin is differential, carrot being about 20 times as sensitive as cress, whereas both plants appear equally sensitive to 2,4-D. A table gives the concentration of both compounds necessary to reduce root growth and germination to 50% of the control values in 9 widely different plant species. The comparison shows that on the whole coumarin requires the higher concentration to inhibit root growth, while with several plants it is more effective than 2,4-D in the inhibition of germination. Solutions of both chemicals were found to cause similar histological changes in the hypocotyl, these formative effects being especially characteristic in radish. In the soil coumarin is broken down by microbes within 48 hours, but this breakdown is inhibited by certain microbiological poisons. The question whether the addition of such poisons to the soil may make coumarin more effective, is now being studied. In reversibility experiments it was found that both a seed and a seedling will recover from the inhibiting action of coumarin on germination and root growth respectively, if soaked in water. Coumarin derivatives proved less effective than the original compound, but in preliminary trials protoanemonin greatly surpassed coumarin in suppressing root growth and the germination of cress.—University College, Cardiff.

1365. GEYER, J. W. C. 632.963: 595.769
A study of the biology and ecology of *Exochomus flavipes* Thunb. (*Coccinellidae, Coleoptera*).
From reprint *J. ent. Soc. S. Africa*, 1947, 9: 219-34.
The economic importance of this black entomophagus ladybird, indigenous to South Africa, lies chiefly in the biological control it exercises on woolly aphid, mealybug and other coccid pests of citrus, vines and other plants.

1366. MARTIN, H., AND SHAW, H. 632.9(43)
Developments in methods and materials for the control of plant pests and diseases in Germany.
Final Report British Intelligence Objectives Sub-Committee **1095**, item **22**, H.M. Stationery Office, London, 1947, pp. 93.
The authors give a full account of the information gathered by them during a tour of Germany in May-June, 1946, when they visited certain industrial organizations and research stations in the British and American Zones. In addition to the subject matter indicated in the title the report deals with weedkillers, rodent poisons and plant growth substances, and with the scheme for the control of proprietary products for plant protection in Switzerland. The material has been assembled into subject sections, and a detailed index is provided. The Colorado beetle presents perhaps the most serious problem of pest control in German agriculture. A map shows the alarming rate of its progress from the Rhine to and across the Elbe. In Switzerland the last Canton has now been invaded by this pest.

1367. TURNBULL, J. 634.1/7-2.95
"Automatic" fruit tree spraying.
Agriculture, 1947, **54**: 36-7.
This system of spraying is by means of nozzles fixed to a machine tractor-driven through the orchard. There are two necessities for success: (1) The pump must have sufficient capacity to deliver enough material to spray the trees thoroughly in the time taken by the machines to pass them. (2) There must be enough nozzles so adjusted and directed as to give a complete spray cover over the tree. The author considers the difficulties in the way of fulfilling these conditions and how they may be overcome.

1368. SWARTENBROEKX, J. M. L. 632.95: 634+635
Belgische sproeikalender voor fruit-, groente- en bloementeelt. **(Belgian spray calendar for fruit, vegetables and flower plants.)** [In Flemish or French.]
Cultuur Hand., 1947, **13**, No. 1, and *Courr. hort.*, 1947, **9**, No. 1, supplement loose folder.
This spray calendar is drawn up along the usual lines for fruit, the operations necessary for the control of pests and diseases throughout the year being indicated, but, as the title implies, it also includes notes for the use of fungicides and insecticides on vegetables and certain commonly cultivated flowering plants. A footnote names the pests controlled by DDT and those for which it is ineffective.

1369. NORRIS, D. O. 632.952
Recent advances in plant protectant fungicides.
Reprint from *Aust. J. Sci.*, 1946, **9**: 1-6, bibl. 23.
Fermate, Arasan or Thiosan, Spergon and quaternary ammonium derivatives are discussed.

1370. GROVES, A. B. 634.11: 632.952.2
Comparative effect of lime-sulfur and flotation sulfur on tree growth and fruit yield.
Tech. Bull. Va agric. Exp. Stat. **103**, 1946, pp. 12, bibl. 22.
A block of about 200 8-year-old Starking Delicious apple trees on a farm near Winchester, Va, was selected in 1941 for use in the comparative tests of the two fungicides for 5 years. In the use of the two materials the general spray practice was followed, viz. lime-sulphur at the rate of 8 quarts to 100 gallons, with 3 lb. lead arsenate and 4 lb. spray lime being added in the petal fall and first cover sprays, and flotation sulphur paste at the rate of 12 lb. per 100 gallons, with 3 lb. lead arsenate and 4 lb. spray lime added in the post-blossom sprays. With the lime-sulphur treatment bordeaux mixture was applied as the second cover spray and with both treatments in all late cover sprays. The trials aimed at showing the secondary effect of the fungicides on yield and tree growth and not differences in scab control, which was excellent in both cases. While tree girth was not affected significantly, yields were considerably higher in the rows treated with flotation sulphur. In the last two years, 1944 and 1945, yields expressed in terms of bushel field crates compared as follows: lime-sulphur, 528 and 460; flotation sulphur, 678 and 585. There was no difference in fruit size or finish for the two treatments; the higher yields of the flotation sulphur series are attributable both to a larger number of fruit buds and to a less severe fruit drop. The lower yields of the lime-sulphur trees appear to be chiefly due to a reduction in photosynthesis. However, where maximum scab control

is a more important factor than minimum injury, the use of lime-sulphur might be preferable. Otherwise the milder type of fungicide is recommended, and it is pointed out that what has been noted about flotation sulphur applies also to dry, wettable sulphurs. The literature on the subject is reviewed.

1371. Mills, W. D. 634.11: 632.952
Effects of sprays of lime sulfur and of elemental sulfur on apple in relation to yield.
Mem. Cornell agric. Exp. Stat. **273**, 1947, pp. 38, bibl. 76.

During 5 years the substitution of elemental sulphur for lime-sulphur after the calyx spray increased the total yield by 64 bushels per acre per year, while this substitution in all sprays increased the yield by 135 bushels.

1372. Roberts, J. W. 632.952
Recent developments in fungicides. II. Spray materials 1936-1944.
Bot. Rev., 1946, **12**: 538-57, bibl. 65.

A continuation of a previous article (*Bot. Rev.*, 1936, 2: 586-600). It discusses the increasing importance of the organic fungicides with particular reference to the derivatives of the dithiocarbamic acids, the diphenylamines, and the chlorine derivatives of quinone and naphthoquinone.

1373. Martens, P. H. 632.952
Contribution à l'analyse des produits phytopharmaceutiques. II. Sur l'analyse du mélange soufre-sulfure de baryum. **(The analysis of plant protection products. II. The analysis of the sulphur-barium sulphide mixture.)**
Parasitica, 1945, **1**: 132-44, bibl. 10.

Instead of extracting the elementary sulphur by means of carbon disulphide the author prefers to combine it with the barium sulphide to form a polysulphide.

1374. Eide, P. M. 638.132: 632.951
Experiments with insecticides on honeybees.
J. econ. Ent., 1947, **40**: 49-54.

Field observations indicate that 5% DDT dust is less toxic to bees than calcium arsenate or cryolite. Laboratory tests show that 2,4-D (2,4-dichlorophenoxyacetic acid, hormone weed killer), piperonyl cyclohexanone, xanthone (bibenzyl pyrone), Velsicol 1068 (a proprietary chlorinated hydrocarbon), and phenothiazine are not toxic to bees; cryolite, calcium arsenate, dinitro compounds, DDT, sabadilla, hexaethyl tetraphosphate, and benzene hexachloride are highly toxic; rotenone and dianisyl trichloroethane may be toxic.

1375. Gimingham, C. T., and Galley, R. A. E. 632.951
DDT insecticides.
Agriculture, 1947, **54**: 130-4.

A very lucid account of present knowledge on the use and limitations of DDT. Among advantages may be noted the fact that DDT spray fluids can be mixed, if desired, with most other insecticides and fungicides in common use.

1376. Steer, W. 632.951: 633/635
The use of DDT in horticulture.
The Geigy Company Ltd., Manchester, 1947, pp. 39.

The booklet, published by the manufacturers of DDT, indicates the use of this insecticide for a large number of horticultural pests, excluding fruit pests. The cucumber family is the only plant family known, for the protection of which DDT cannot be safely used.

1377. Ross, W. A. 632.951: 634/635
Recommendations for the use of DDT against agricultural insect pests in 1947.
Processed Publ. Dep. Agric. Canada, Div. Ent. **64**, 1947, pp. 5.

Potato, vegetable, tobacco, fruit, ornamentals and greenhouse insects.

1378. Jenkins, C. F. H., and Forte, P. N. 632.951
1945-1946 experiments with D.D.T. and 666 as agricultural insecticides.
J. Agric. W. Aust., 1946, **23**: 307-17, bibl. 12.

DDT did not kill all important insect pests and many mites proved particularly resistant. It was very effective against caterpillars, and cabbages and cauliflowers treated periodically with a 1% DDT dust were practically free from all signs of chewing injury. Tomato plants treated from seedling to maturity showed a marked reduction in the number of "wormy" fruits. It gave satisfactory results against Argentine ant (*Iridomyrmex humilis*), climbing cutworm (*Heliothis armigera*), apple leafhopper (*Typhlocyba froggatti*) and vegetable leafhopper (*Empoasca terra-reginae*). There are indications that leaf-eating orchard pests can be controlled by 0·1% DDT sprays, but tests against scale insects and many aphids have been disappointing and *Bryobia* mite appears to be quite unaffected. Gammexane, in these tests, was inferior to DDT against most insect and allied pests. In grasshopper baits it acted more quickly than either DDT or arsenite of soda. It is much less toxic to mammals than DDT or arsenic and so has definite advantages over these insecticides for certain purposes.

1379. Proverbs, M. D., and Morrison, F. O. 632.951
The relative insecticidal activities of DDT and related organic molecules.
Canad. J. Res., 1947, **25**, Sec. D, pp. 12-44, bibl. 20.

Of 18 chemicals tested only Gammexane and the difluoro analogue of DDT exceeded the toxicity of DDT to *Drosophila melanogaster*. All alterations of the DDT molecule, except the substitution by F of the phenyl chlorine atoms, were found to interfere seriously with its insecticidal action. —McGill University, Quebec.

1380. Tilemans, E. 632.951: 632.76
Le DDT et ses possibilités. **(DDT and its possibilities.)**
Parasitica, 1945, **1**: 64-73, bibl. 7.

The chemical structure and properties of the newer organic insecticides, particularly DDT, are discussed. An experiment is described using a DDT powder on the Colorado beetle by placing it on various parts of the body of the adult, legs, elytra and abdomen; it was least effective on the elytra. It had no effect at a distance. Notes are given on trials against aphids, Colorado beetle and cockroach. The author concludes that DDT offers great possibilities in plant protection but that at present it is too dear for general use.

1381. Prill, E. A., Synerholm, M. E., and Hartzell, A. 632.951
Some compounds related to the insecticide "DDT" and their effectiveness against mosquito larvae and houseflies.
Contr. Boyce Thompson Inst., 1946, **14**: 341-51, bibl. 40.

Thirty-two compounds of the DDT type are described and compared with respect to their effectiveness against mosquito larvae and houseflies. Among them are several unsymmetrical analogues.

1382. Gunther, F. A., and Tow, L. R. 632.951
Inhibition of catalysed thermal decomposition of DDT.
J. Soc. chem. Ind. Lond., 1947, **66**: 57-9, bibl. 13.

In the laboratory, picolinic acid and salicylal-aminoguanidine have been found to inhibit the iron catalysed thermal (110-120° for 24 hours) decomposition of technical grade DDT very effectively at concentrations as low as 2% of the inhibitor. Under similar conditions the technical grade DDT decomposed (dehydrohalogenated) quantitatively. [Authors' summary.]—Citrus Experiment Station, Riverside, California.

1383. ANON. 632.951
Does DDT stimulate plants ?
Plants and Gardens, Brooklyn, N.Y., 1946, **2**: 199.
A report, quoted from AIF News, May, 1946 (Agricultural Insecticide and Fungicide Association), that all parts of insect-free plants were stimulated.

1384. LEEFMANS, S. 632.951
D.D.T. in combinatie met andere middelen. **(DDT combined with other biocides.)** [English summary 12 lines.]
Meded. Direct. Tuinb., 1947, **10**: 17-18.
American work on mixing DDT with other substances is briefly reviewed. It is pointed out that lime (as used in fungicides) may have an unfavourable effect on the activity of DDT. Thus to mix DDT with copper-lime dust is not recommended, but DDT can be used with bordeaux mixture 8 : 4 : 100. Emulsions containing DDT are liable to cause damage to leaves, so wettable powders are preferable. A 3% DDT dust with talc or pyrophyllite, 30-35 lb. per acre, gave good results against leafhoppers, halticids, Colorado beetle, and bugs, and only moderate results against aphids.

1385. FAHEY, J. E., AND RUSK, H. W. 634.11-2.951
Ratio of labile chlorine to total chlorine in DDT spray-residue deposits in southern Indiana apple orchards.
J. Ass. off. agric. Chem. Wash., 1947, **30**: 349-54, bibl. 5.
The data confirm earlier results, which suggest that " total chlorine and/or labile chlorine analysis would be a satisfactory basis for the estimation of DDT in spray residues on fruit of known history ".

1386. ANON. 632.951
A new synthetic insecticide.
Nature, 1946, **158**: 701.
A short note on " Velsicol 1068 ", a chemical of unrevealed composition with the empirical formula $C_{10}H_6Cl_8$. It is a viscous, colourless, odourless liquid, less volatile than Gammexane, more volatile than DDT. In solubility it resembles these substances, and in toxicity to insects it comes somewhere between them. It has been produced by the Velsicol Corporation in Chicago and is to be marketed in Great Britain by the Hygienic Chemical Co. Ltd.

1387. LEEFMANS, S. 632.951
Nog een nieuw-insecticide uit de Vereenigde Staten. **(Another new insecticide in the U.S.A.)** [English summary ½ p.]
Meded. Direct. Tuinb., 1947, **10**: 76-8.
Notes on the information the author has been able to get from various sources on the recently-discovered insecticide known as Velsicol 1068 (see above). It is said to be a methylated naphthalene, is a solvent for DDT, rotenone, pyrethrine and nicotine, and a synergist and solvent for aerosols, larvicides and fumigants. It is preferable to other insecticides because of its high solvability, high boiling point and high flashpoint. It affects natural and synthetic rubbers and is poisonous to small rodents.

1388. STEARNS, L. A., AND OTHERS. 635.6/7: 632.951
A chlorinated bicyclic terpene used to control certain fruit and vegetable insects.
J. econ. Ent., 1947, **40**: 79-83, bibl. 4.
During 1947 toxaphene was effective against codling moth on apples, did not increase red mites, failed to control curculio and decreased damage by the oriental fruit moth but reduced its parasites. It caused no injury on apples, grapes, peaches and on string and lima beans, but damaged cucumbers and cantaloupes severely.—Delaware.

1389. O'KANE, W. C. 632.951
Results with benzene hexachloride.
J. econ. Ent., 1947, **40**: 133-4.
The crude substance caused objectionable flavours in potatoes, peas and sweet corn.

1390. GERSDORFF, W. A., AND BARTHEL, W. F. 632.951
Determination of pyrethrins deterioration.
Soap san. Chem., 1946, **22**: 10: 155-7, bibl. 1.
The action of pyrethrum concentrate was not impaired after storage for 170 days, if kept in the dark at 2° C. For storage at higher temperatures and in the light the addition of 0·1% hydroquinone is recommended as an inhibitor of loss of toxicity. The solubility of pyrethrum concentrates in dichlorodifluoromethane was found to provide a measure of deterioration in the insecticide.

1391. NEL, R. G., AND MATHEW, G. E. A. 632.951
The toxic life of pyrethrum-in-oil films.
Sci. Bull. Dep. Agric. S. Afr. **239**, 1944, pp. 13, bibl. 6, 3d.
Pyrethrum-in-oil insecticides are usually applied as fine mists in warehouses and stores, especially against free-flying insect pests of stored products. Studying the toxic effect of these sprays on crawling and non-active flying insects, the authors found that in the dark the insecticidal action of the film is relatively persistent, viz. about 80% control after 48 hours. If the film is exposed to subdued light, control drops from over 90% after 6 hours to below 50% after 36 hours. Direct sunlight destroys the toxicity of the film almost immediately. A minimum of light should therefore be allowed to enter warehouses after spraying.—Entomological and Plant Quarantine Station, Rosebank, C.P.

1392. MYBURGH, A. C. 634.2-2.951
Oil sprays on stone fruits in summer.
Reprint from *J. ent. Soc. S. Afr.*, 1944 (?), p. 1, bibl. 1.
In South Africa it would be desirable to incorporate an ovicide in sprays against codling moth of apricots and other stone fruit. Tests were made to determine the susceptibility of various stone fruit trees to summer oil applications, and it was found that 2-3 sprays of light, highly refined mineral oil at 1% will not injure the foliage. The effect of the oil on the fruit and on the general health of the tree remains to be ascertained.

1393. LEEFMANS, S. 632.944
Azobenzene, een nieuwe fumigant voor kassen en als dust. **(Azobenzene as a fumigant and as a dust.)** [English summary 19 lines.]
Meded. Direct. Tuinb., 1947, **10**: 11-16.
During a visit to the United States the author obtained information on recent experiments carried out by Dr. Blauvelt at the Cornell University, on the use of azobenzene as a fumigant and as a dust against red spider and other pests. Very encouraging results have been obtained and its effects compare very favourably with those of naphthalene, particularly as it can be used as a dust as well as a fumigant. In the U.S.A. it is already being used on a commercial scale particularly for roses in hot-houses. It is suggested that this will lead to experiments in Holland if the price is reasonable.

1394. MILLER, L. P. 632.943
A rapid method for the evaluation of the larger particles present in cocoa powders.*
Contr. Boyce Thompson Inst., 1946, **14**: 335-40.
A rapid method for evaluating the coarser particles present in cocoa powder is described. This involves the measurement of the rate of settling of the first ten particles in a 144 cm. tube filled with 95% alcohol. Data are given showing the reproducibility of the method and illustrating the effect of the presence of various percentages of a coarse fraction in a finely-ground cocoa. It is also shown that by measuring the time required for various fractions of the powder to settle (with aid of a graduated pipette forming

* Reproduced as likely to interest those concerned with fungicidal and insecticidal dusts. See also 1395m.

the lower part of the settling tube) the particle diameter corresponding to the 50% point by volume can be determined with the aid of Stokes' Law. It is suggested that evaluation of a cocoa powder, or other powders, by measuring the time required for the first ten particles to settle, should be useful in cases in which primary interest is concerned with the larger particles present and in which more involved studies of particle size distribution are not feasible. [Author's summary.]

1395.

a DONOVAN, C. G. 632.951
The determination of DDT. A review of analytical methods for the determination of DDT in the technical and pure compounds and in various insecticides, by total chlorine procedures.
Soap san. Chem., 1946, **22**: 6: 165-7, 201, bibl. 4.

b FRAZIER, N. W. 634.22-2.76
Injury to fruit of plums caused by *Dicerca horni*.
J. econ. Ent., 1946, **39**: 660, bibl. 3.
In Tulare County, Calif.

c GRAHAM, C., AND CORY, E. N. 634.11-2.728
Control of grasshoppers injuring apple orchards.
J. econ. Ent., 1946, **39**: 816.
In Washington County, Md, with benzene hexachloride.

d GROVE, J. F., AND BOVINGTON, H. H. S. 632.951
Thiocyanate insecticides: the relation between knock-down activity and chemical constitution.
Ann. appl. Biol., 1947, **34**: 113-26, bibl. 32.
The house fly was test insect.—I.C.I. Ltd.

e HADORN, C. 632.42: 634.11
Beurteilung des Schorfbefalles und der Verbrennungen bei grössern Bekämpfungsversuchen. **(The estimation of apple scab incidence and spray injury in large-scale scab control trials.)**
Schweiz. Z. Obst- u. Weinb., 1940, **49**: 367-70 [received 1947].

f HAZEN, A. C., AND GOODHUE, L. D. 632.951
Insecticidal aerosols. Stability in storage studied by accelerated ageing tests.
Soap san. Chem., 1946, **22**: 8: 151-5, bibl. 6.

g DE JALON, P. G., AND WEST, G. B. 632.951
Use of potassium in the assay of curare.
Nature, 1947, **159**: 841, bibl. 2.

h KEIFFER, H. H. 632.654.2
A review of North American economic Eriophyid mites.
J. econ. Ent., 1946, **39**: 563-70, bibl. 9, ref. ca. 60.

i KNUTSON, H. 632.781
Minnesota *Phalaenidae* (*Noctuidae*). The seasonal history and economic importance of the more common and destructive species.
Tech. Bull. Minn. agric. Exp. Stat. **165**, 1944, pp. 128, bibl. 39 [received 1947].

j LENANDER, S. E. 634.23-2.3
Gummiflöde hos körsbärsträd, dess orsak och bekämpning. **(Bacterial canker of cherries, its cause and control.)**
Sver. pomol. Fören. Årsskr., 1946, **47**: 52-61, bibl. 20.
A review of the literature.

k MCGOWAN, J. C. 632.95: 582.8
The chemistry of fungal antibiotics in relation to soil microbiology.
Chem. Industr., 1947, No. 16, pp. 205-7, bibl. 39.

l MAHDIHASSAN, S. 634.11-2.77
Two symbiotes of *Psylla mali*.
Nature, 1947, **159**: 749, bibl. 1.

m MILLER, L. P. 633.74-1.56
Particle size distribution in cocoa powders.
Contr. Boyce Thompson Inst., 1946, **14**: 325-34, bibl. 9.

n NEAL, P. A., AND VON OETTINGEN, W. F. 632.951
Toxicity of DDT [to man and animals], a report on experimental studies.
Soap san. Chem., 1946, **22**: 7: 135-43, bibl. 23.

o OWENS, H. B., AND DITMAN, L. P. 635.646: 632.951
Liquefied gas aerosols to control insects in eggplant.
J. econ. Ent., 1946, **39**: 405-6, bibl. 1.

p PASTAC, I. A. 632.693.2: 632.959
Les colorants nitrés et leurs applications particulières. III. Colorants raticides. **(2,4-dinitro-ortho-cresol as a rat poison.)**
Reprint from *Chim. Industr.*, 1945, Vol. **53**, Nos. 1-2, pp. 16, bibl. numerous.

q SCHUH, J., AND ZELLER, S. M. 634.75: 632.6/7 + 632.3/4
Insect pests and diseases of strawberry in Oregon.
Stat. Bull. Ore. agric. Exp. Stat. **419**, 1944, pp. 40.

r TRUFFAUT, G., AND PASTAC, I. 634.1/8: 632.951
Le traitement des arbres fruitiers par les colorants organiques nitrés. **(Winter spraying fruit trees and vines with D.N.C.)**
Reprint from *Génie civ.*, 1 and 15 Feb., 1944, pp. 7, bibl. 29.
A general review.

s TUNBLAD, B. 634.1/7-2.9
Några synpunkter på aktuella bekämpningsproblem inom fruktodlingen. **(Disease and pest control in fruit growing. The position to-day.)**
Sver. pomol. Fören. Årrskr., 1946, **47**: 62-8.

t TURNER, W. F. 634.22-2.754
Distribution of plum-feeding species of *Macropsis*.
J. econ. Ent., 1946, **39**: 394-5, bibl. 6.
In the U.S.A.

u ZELLER, S. M., AND SCHUH, J. 634.7: 632.3/4 + 632.6/7
Diseases and insect pests of cane fruits in Oregon.
Stat. Bull. Ore. agric. Exp. Stat. **418**, 1944, pp. 58.

VEGETABLE, TOBACCO, RUBBER AND OTHER PLANTS.

1396. LAMM, R., TOMETORP, G., AND HINTZE, S. 635.1/5: 631.521.3
Sort- och stamförsök med köksväxter år 1946. **(Vegetable strain and variety trials [at Alnarp] in 1946.)** [English summary 6 pp.]
Reprinted from *Årsskr. Alnarps Lantbruks-Mejeri-Trädgårdsinst.*, 1946, pp. 227-76, bibl. 20, being *Meddel. Trädgårdsförs.* **37**.

This bulletin reports the latest results of the Swedish vegetable variety trials laid down at Alnarp. A special feature of the report for 1946 is a discussion of different methods of judging economical and biological earliness in a variety. For the determination of *economical earliness* the use of definite dates, for instance the comparison of tomato yields up to 1 June, is rejected as artificial and misleading in view of varying meteorological conditions in different years. Nor is the counting of a fixed number of days from the beginning of the harvest recommended, since the inclusion of an extremely early variety in one year may upset the limits of the first period. At Alnarp these periods are fixed by introducing a standard variety, e.g. Kondine Red/41, for early glasshouse tomatoes. The first period extends

from the beginning of harvesting to the day when the standard variety has produced a quarter of its total yield of ripe fruits. The second period may extend to the date when the standard variety has produced half of its yield. Thus, the periods are exactly defined and they follow at the same time the changes in developmental rhythm caused by changes in environmental conditions in different years. *Biological earliness* is characterized at Alnarp by the number of days from sowing or planting to the time when a quarter, half, and three-quarters of the total crop is harvested. This method has been particularly valuable for comparing different samples of seed at the Swedish State Seed Testing Station. Also, the figures give good information on the date of the main harvest and its length. It is pointed out that biological and economical earliness will often run parallel ; this is, however, not necessarily so, if the varieties to be compared differ in total yields. Other methods of estimating earliness were applied to onions, where the extent of leaf wilting at the end of the season was recorded, and to carrots, beets and radishes where the rate of growth was measured. Economic earliness in forcing carrots, for instance, is determined by yields at the first pulling. In certain vegetables, e.g. winter cabbage, the so called mean day of harvesting is computed.

1397. ABBISS, H. W. 635.1/7
Growers' notes and extracts from demonstration work 1945-46.
Cornwall C.C., 1946 (?), pp. 30.
This little publication will probably be the last of a series of Annual Growers' Notes, which have been distributed in Cornwall during the past 20 years, reporting the results of trials carried out at the Gulval and Ellbridge Experimental Stations. Data are given on vegetable cultivation outdoors as well as under Dutch lights and cloches.

1398. MARTÍNEZ CROVETTO, R. 588.93: 633/635
Las umbeliferas cultivadas en la Republica Argentina, con una clave para su reconocimiento por medio de los frutos. **(The *Umbelliferae* cultivated in the Argentine Republic with a key for their recognition by their fruits.)**
Rev. Invest. agric. B. Aires, 1947, **1**: 3-51, bibl. 108.
The 17 species of umbelliferous plants cultivated in the Argentine are described, grouped as (*a*) garden plants, (*b*) condiments and medicinal plants, (*c*) food plants, and (*d*) ornamentals. A key based on the morphology of the fruit serves for their identification.

1399. MUNGER, H. M. 635.1/7: 631.523
The place for hybrid types of vegetables. 60th Trans. Peninsula hort. Soc., 1946, in *Bull. Delaware St. Bd agric.* **36**: 5: 49-57.
A review of the performance of first generation hybrids shows that the following vegetables have already shown themselves well suited for the use of first generation hybrids —summer squash, advantage achieved, earlier maturity; tomato, increased early crop; cucumber, higher yield and greater uniformity; eggplant, higher yield; water melons, higher yield. The author discusses the process necessary for the production of such hybrids and he considers that the practice might well be extended to musk melons, winter squash and cabbage.

1400. WENT, F. W. 635.1/7: 612.014.44
Effects of temporary shading on vegetables.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 374-80, bibl. 3.
Trials are reported from the California Institute of Technology, Pasadena, and the results summarized as follows: " Several vegetables were grown in plots which could be covered with black paper or with cloth. Each day these plants were covered for a definite length of time. It turned out that the yield of lettuce and cauliflower was decreased by any length and type of covering, whereas tomatoes and eggplants were strongly stimulated in growth and fruiting by daily covering from 14:00 until next morning 7:00. Other plants like beets and celery were little affected. The decrease in light preferably should be to 10% or less of normal daylight."

1401. STRYDOM, E. 635.1/7: 632.183
Rye windbreaks for vegetable plots.
Fmg S. Afr., 1947, **22**: 345-6.
Rye was used successfully as a windbreak and showed few of the disadvantages of hedges or matting shelters.

1402. SEELYE, G. D. 635.1/7: 631.531
The number of vegetable seeds per unit weight.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 391-7, bibl. 6.
The number of seeds per ounce of particular vegetables from the same firm was found to vary considerably in some cases from year to year. The seeds considered were of beet, carrot, onion, lettuce, tomato, cucumber, snap bean and sweet corn.—Cornell.

1403. BEÏLIN, I. G. 632.53: 635.1/7
A scarcely known broomrape (*Orobanche*)—a menace to many crops. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1947, No. 1, pp. 29-30.
Orobanche muteii is very destructive to cabbage and tomato in certain parts of Russia. Affected cabbages are checked in growth, and the size and density of the heads are adversely affected. Tobacco also is attacked. Control measures recommended are: (1) Long-term rotation so that a susceptible crop is not grown on an affected piece of land until after 6-8 years. (2) Late varieties of cabbage, tomato and tobacco should be grown only on ground known to be free from the seeds of the parasite. (3) On infested soil, resistant plants only should be grown, e.g. maize, sunflower, beetroot, carrot, eggplant, onions and pepper. Early varieties of cabbage may be grown on infested soil as " provocation " plants, for they suffer little injury. If tomatoes or late varieties of cabbage are grown on such soil the stumps and stems should be taken up and destroyed immediately after harvesting the crops. Observations on the degree of susceptibility shown by cabbage, tomato and tobacco suggest that there are physiological forms of the parasite.

1404. ŠČERBINOVSKII, N. 632.78: 633/635
Euxoa segetum. [Russian.]
Kolhoznoe Proizvodstvo (Collective Farming), 1946, No. 9-10, pp. 26-7.
The life history, habits and methods of combating this moth are described. In the U.S.S.R. it damages not only winter cereals, but sugar beet, tobacco, cotton, market garden crops and members of the *Cucurbitaceae* family.

1405. DUMBLETON, L. J. 635.1/7: 632.654.2
The red-legged earth mite. Measures for control of pest and protection of vegetables.
N.Z. J. Agric., 1947, **74**: 9-13.
The red-legged earth mite (*Halotydeus destructor* Tucker), first observed in New Zealand in 1942, has long been known as a pest of vegetables in the Cape Province of South Africa, Western Australia, and in all the southern States of Australia. The adult mite is about $\frac{1}{75}$ in. long, mat black with a rather velvety appearance. It attacks a very wide range of weeds and cultivated plants. Tomatoes, French beans, broad beans, peas, potatoes, asparagus, silver beet, and marrows have been damaged in New Zealand, melons, turnips, tobacco and lettuce in Australia. Experiments carried out in New Zealand have indicated that the mite can be effectively controlled with any of the following: (1) wettable DDT (20% DDT content), 1 lb. to 100 gal. water, (2) DDT dust (2% DDT content), (3) DDT oil emulsion (3% DDT content), 1 gal. to 100 gal.; Blackleaf 40, $1\frac{1}{2}$ fl. oz., white oil 6 fl. oz., water 5 gal. Good control was also obtained with a

4% Gammexane dust and a 5% dispersible Gammexane powder at 1 lb. to 100 gal. water, but there was some indication of injury to the plants by this material.

1406. GLENDENNING, R. 632.721: 635.1/7
The European earwig.
Processed Publ. Dep. Agric. Canada, Div. Ent. **21,** revised 1947, pp. 5.
The European earwig, *Forficula auricularia*, apart from being a nuisance in the house, has frequently caused very serious damage to seedling vegetables. Control: by baiting (formula specified), trapping, or spreading a 3% DDT-talc dust in the crotches of trees, etc., where the pest hides in numbers in the daytime.

1407. FARRAR, M. D., AND WRIGHT, J. M. 632.951: 631.531.17
Insect damage and germination of seed treated with DDT.
J. econ. Ent., 1946, **39**: 520-2.
Various vegetable seeds were protected against damage by insects with dust containing from ½ to 20% DDT; germination was not reduced.

1408. TUNBLAD, B. 635.1: 632.951
Taga rotfrukter och grönsaker smak av hexaklorcyklohexanpreparat ? **(Do root crops and vegetables take the taste of Gammexane ?)**
Växtskyddsnotiser, 1947, No. 1, pp. 12-13.
An article in *Schweiz. landw. Monatshefte*, 1946, 15 December [author not mentioned] is discussed. According to this source, the use of Gammexane as a soil disinfectant resulted in a disagreeable flavour of cabbages, carrots and potatoes, especially in wet seasons. This is confirmed by reports from Norway, where extensive trials with carrots and other root crops were carried out.

1409. MOORE, L. B. 582.73: 578.6
New Zealand seaweed for agar-manufacture. Review of supplies.
N.Z. J. Sci. Tech., 1946, **27,** Sec. B, pp. 311-7.
The entry of Japan into the war created a shortage of the seaweed products used for the preparation of agar-agar. In New Zealand collecting seaweed for this purpose began in earnest in 1942. Collections of *Pterocladia lucida* and *P. capillacea* from various coastal districts were examined, and are commented on in the present article. Records from individual localities indicate that the beds are likely to continue to yield at approximately the present rate. The annual harvest could be increased considerably by opening up new areas if the need arose and local collecting difficulties could be overcome.

1410. GAMBLE, W. H. 631.544
Heating of glasshouses in small nurseries.
Agriculture, 1947, **53**: 498-501.
Heating of glasshouses in large nurseries.
Agriculture, 1947, **53**: 548-51.
In the first of these articles the author deals with the low-pressure hot water system. The efficiency obtainable under such a system depends largely on the fireman's skill and on the care given to such details as (1) correct adjustment of dampers, (2) keeping the correct thickness of fire, (3) minimum stirring of fire, (4) lagging exposed surfaces, (5) controlling temperature in house to fine limits.
In the second he deals with steam systems, namely, direct steam heating, steam to water heating, hot-water forced circulation system, and gives hints on steam boiler operations generally.

1411. COCHRAN, H. L. 633.842: 674.048
Some physical responses of pimiento plants to creosote when used for treating timbers in steam-heated hot beds.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 381-5, bibl. 1.
When pimiento seed was planted at Griffin, Georgia, in hot beds, the timbers of which had been treated not more than 9 months previously with creosote, the seedlings suffered badly on emersion. A relatively high air temperature appears to be a necessity for the volatilization of the toxic agent in creosote.

1412. MAINE AGRICULTURAL EXPERIMENT STATION. 633.491
Potatoes.
Reprinted from *Bull. Me agric. Exp. Stat.* **442,** 1946, pp. 113-94.
This is a research progress report, chiefly concerned with the results of the 1945 crop season, which are discussed under the following heads: (1) *Diseases and insects*: (*a*) Bacterial ring rot; disinfection; resistance in certain varieties and progenies from crosses with resistant varieties. (*b*) Leaf roll including net necrosis. (*c*) Aphids affecting potatoes. It was proved that aphid control by DDT, applied as an aerosol, spray or dust, will result in substantial increases in yield. During the critical period in August incoming winged aphids must be controlled almost completely, if leaf roll is to be checked, since such dispersing aphids settle readily on sprayed green foliage and spread the disease. Hence leaf roll can be eliminated only by co-operative efforts on an area basis. (*d*) Translocation of DDT to potato tubers. (*e*) Eradication of weeds; the herbicide 2,4-D (1 : 600) showed promise in the defoliation and killing back of such woody aphid hosts as wild plum, wild rose and dwarf buckthorn. (*f*) Stem-end browning. Late planting resulted in more stem-end browning than did early planting, whereas the date of harvest had very little effect on the development of the disease. (*g*) Late blight and early blight. Four organic fungicides were compared with bordeaux and basic copper sulphate as to their efficiency in controlling blight, flea beetles and aphids, in combination with DDT and alone. Two neutral coppers and Fermate gave the least control of early blight, and Karbam Z. the best. The addition of DDT increased the fungicidal action of most of the preparations against early blight. (*h*) Potato scab. A pH value of 5·5 was the approximate dividing line between soil conditions producing clean and scabby potatoes. (2) *Soil fertility*: (*a*) More lime would increase yields in Maine. (*b*) Phosphorus and potash manuring. On soils containing less than the average amounts of P and K, increases in yield were obtained with 80 and 120 lb. P_2O_5 and 150 and 200 lb. K_2O per acre respectively. (*c*) Green-manure crops. Millet plus nitrogen is at least as good as crimson clover in supplying organic matter to potato soils. (3) *Seed stock practices*: (*a*) Green sprouting increased yields markedly above controls and above those obtained from tubers treated with starter solutions. (*b*) The control of tuber size (=larger number of medium-size tubers) by the thiourea dip method should be seriously considered, possibly combined with closer than usual spacing of seed pieces. (4) *Potato products*: (*a*) Starch. (*b*) Dehydrated potatoes; scorch and heat damage; greying; effect of reducing sugars on storage life (a sugar content above 2% of the dry weight is harmful); preparation of potato granules to be reconstituted in one minute; etc. (5) *Economics of the potato industry*. An appendix of 20 pages presents the experimental data in the form of tables.

1413. KEMPTHORNE, O. 633.491-1.87
Recent developments in the design of field experiments. IV. Lattice squares with split-plots.
J. agric. Sci., 1947, **37**: 156-62, bibl. 12.
The experiment described was carried out at Rothamsted on potatoes in 1945 and was one of a series aimed at testing various types of organic manure.

1414. GONČAROV, A. G. 612.014.44
On the influence of photoperiodic induction upon the development of certain plants under the conditions of Tomsk.
C.R. Acad. Sci. U.R.S.S., 1946, **54**: 361-3, bibl. 5.
Experiments on the effect of photoperiodic reaction upon potato, peppermint (*Mentha piperita*), and foxglove (*Digitalis*

purpurea) were conducted at the Siberian Botanical Gardens at Tomsk in 1943-4. The 8- and 10-hour day increased considerably the rate of growth, the development and tuber formation in potato. Peppermint reacts strongly to a shortened day by increasing the yield, both of raw and dry mass, while its flowering is delayed. Photoperiodic influence (12-hour day period) increased the frost resistance of *Digitalis purpurea*, thus solving the problem of cultivating it and obtaining seed under the local conditions.

1415. VAN DER PLANK, J. E. 633.491: 581.056
Some climatic factors determining high yields of potatoes. Part I. Temperature and length of growing season.
Emp. J. exp. Agric., 1946, **14**: 217-23, bibl. 9.

The author first sets out the climatic requirements for growing potatoes successfully. The potato is unusual in its reaction to temperature. It needs a cool growing season, but is intolerant of anything but a trace of frost. A long, cool growing season free from frost is characteristic of practically only two types of situation, (1) high altitudes in tropical or sub-tropical latitudes, where high altitude ensures coolness, and nearness to the equator prevents great seasonal variation in temperature, and (2) maritime climates at high latitudes, where high latitude makes for coolness, and the sea is the buffer against great temperature changes. These types are represented respectively by the two ancient homes of the potato, the Andean potato centre, and the island of Chiloe, in south Chile. In the British Isles and NW. Europe the climate is maritime, like Chloe's, and it is significant that the world's record for yield was put up in Ireland, and the highest average yields are found in the Netherlands. In continental climates at high latitude, such as NE. Eurasia and most of N. America, where the potato is grown on a large scale, the seasons may be either cool or long, but not both cool and long, and the problem is to determine how the crop is affected and what the chances are of overcoming the difficulties by breeding. The difficulties encountered in potato culture in regions where the climates do not fit into either of the two types, and the possibilities of improving yields in high latitude, continental climates by breeding are discussed with reference to the frost-resisting qualities of *Solanum acaule* and *S. demissum*.

1416. VAN DER PLANK, J. E. 633.491: 581.056
Some climatic factors determining high yields of potatoes. Part II. The potato at low latitudes and high altitudes.
Emp. J. exp. Agric., 1947, **15**: 1-8, bibl. 18.

The author states that for high yields the potato needs short days and a growing season which is long and cool but free from frost. He discusses these requirements in relation to potato-growing in various climates and suggests that the failure of most modern varieties to make adequate use of the short days of autumn largely accounts for the failure in Britain to raise yields per acre during the last 100 or 150 years. These results are discussed in relation to a suggestion that there is a limit to the extent to which plant breeding can adapt a crop to new climatic circumstances. [From author's summary.]

1417. SINSKAJA, E. N. 633.491
Experiments with potato culture in the semi-humid areas of the Transcaucasian subtropics. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1946, No. 5-6, pp. 15-17.

Both moist and dry vernalization stimulate development and size of the potato plant, particularly in the early period of development. Moist vernalization (sprouting in moist sawdust) gave better results than the dry method (drying in the open air), both with summer and with spring sown plantings. Winter planting is considered in relation to the question of clearing fallow ground of weeds, particularly since the operation obviates the trouble of winter storage of seed tubers.

1418. BALD, J. G. 633.491
A plan of growth, maturity, and yield of the potato plant.
Emp. J. exp. Agric., 1946, **14**: 43-8, bibl. 11.

The general plan of growth in potato is founded on the principle of competition for the available metabolites between the various organs of the plant. The partition of metabolites between organs may be governed by hormones or growth-substances manufactured in the leaves or growing tips. From this it may be assumed that (1) The basic efficiency of the metabolic centres is similar for different varieties of potato. (2) Under similar environmental conditions the division of metabolites in various proportions between the organs of the potato plant induces in different varieties and strains differences in growth-form, maturity, and yield. (3) The partition of metabolites in plants of a single variety or strain in a similar environment, but on different occasions, will be quantitatively similar; and changes in the environment will produce characteristic changes in the partition of metabolites. The general course of growth of the potato plant may be divided into stages. In the first stage the main shoot emerges and extends, and the leaves arising directly from the main stalk expand; the duration of this stage is largely determined by the average size of leaves on the main stem. The second stage opens with the beginning of the rapid growth of axillary shoots above ground, or below (stolons). At this stage the first important evidence of differential growth appears. The differences between contrasting varieties in the length of the second stage may be of the order of 2 months and the difference in leaf-area as high as 10 : 1. It is the partition ratio of metabolites in this stage that mainly determines the size of the haulm and largely, but not in such high degree, determines maturity. The third stage corresponds with what is generally known as the senescent stage. It occupies the period from the time when the potato haulm reaches its maximum size until the haulm and roots are dead and the tubers are fully formed. Maturity is mainly determined by (1) the size of the leaves and the consequent hastening or delay of axillary growth, (2) the initial partition ratio of metabolites between foliar axillary shoots, and stolons and tubers, (3) the rate at which the partition coefficient for metabolites passing to the foliage declines, and the time at which the haulm reaches its maximum size, (4) the length of time during which the size of haulm remains static and current metabolites descend to the tubers, and (5) the rate at which reserves of food materials in the foliage and roots are mobilized and translocated to the tubers.

1419. PUJALS, E. A., NYLUND, R. E., AND KRANTZ, F. A. 633.491-1.532.2
The influencing of sprout-inhibiting and sprout-inducing treatments on the growth and yields of potatoes.
Amer. Potato J., 1947, **24**: 47-56, bibl. 15.

Triumph and Cobbler potatoes dusted with the methyl ester of naphthaleneacetic acid (20 mg. per kg. potatoes) when planted produced no measurable weight of sprouts in 99 days, whereas untreated tubers sprouted freely during that period. On the other hand, tubers previously treated to inhibit sprouting, when treated with ethylene chlorhydrin just before planting, sprouted more rapidly than comparable untreated tubers and their final stand was equally as good. As regards actual crop, however, doubly treated tubers did not produce quite so highly as entirely untreated tubers. It is thought that proper timing of treatments would eliminate such differences.

1420. BELJDENKOVA, A. F. 633.491-1.531
Propagating potatoes by seeds. [Russian.]
A symposium on scientific work carried out at Leningrad, 1941-43, 1946, pp. 363-5, bibl. 5. Komarov bot. Inst. Acad. Sci. U.S.S.R., Leningrad.

Seeds from 11 potato varieties [unspecified] were sown in the

hot-house on 13 and sprouted on 25 March; later the seedlings with 4-5 leaves were transplanted in the hot-house and in the open when warmer weather set in. Plants grown from seeds had 10-15 tubers weighing up to 80 g. each, while individual tubers reached the weight of 150 g. and more.

1421. ROSELLA, E. 633.491: 577.17
Pour conserver les pommes de terre de consommation on peut désormais les empêcher de germer. **(Potatoes for food can in future be prevented from sprouting.)**
Progr. agric. vitic., 1947, **127**: 112-4.
A review of the methods that have been adopted in the past to prevent the sprouting of potatoes, and a reference to the modern use of plant hormones (e.g. Rhizopon C) for that purpose.

1422. RUBIN, B. A., AND SOKOLOVA, V. E. 633.491
Courbes thermiques de la synthèse de l'amidon dans les pommes de terre au cours du développement de la plante. **(Thermal curves of starch synthesis during the development of the potato plant.)**
C.R. Acad. Sci. U.R.S.S., 1946, **54**: 333-6, bibl. 13.
The data obtained show that the thermal curve of synthetic action of invertase does not remain constant. The character of the curve depends on the growth phase and on the development of the plant; the displacement of the optimal points on the curve corresponds in a definite degree to the adaptability of the plant to the ordinary variations of temperature during the vegetative period.

1423. POLLARD, A. 633.491
Field factors affecting the quality of potatoes.
Agriculture, 1947, **54**: 31-5, bibl. 5.
Studies at Long Ashton show that quality in potato is influenced by site, variety and fertilizer, in that order of magnitude. Thus on bad sites the effects of variety and fertilizer are relatively small, whereas on better sites they both may help to decrease blackening. Blackening is not apparently influenced by the pH of the soil. On good sites potash has improved colour and texture, and phosphate has increased mealiness. Nitrogen in excess causes close texture and lack of mealiness. Dung decreased blackening in K-deficient soils but tended to give excessive mealiness. Seasonal effects have been relatively slight.

1424. TOTTINGHAM, W. E., AND OTHERS. 633.491
Blackening indices of potatoes grown under various conditions of field culture.
J. agric. Res., 1947, **74**: 145-64, bibl. 3.
No single factor or combination of factors was responsible for blackening of potatoes on boiling; the complexity of the factors involved was emphasized. The only fertilizer element that showed any marked control of the blackening was potassium, which sometimes decreased it considerably. Climatic or soil conditions appear to be involved. Blackening could be prevented by exposing susceptible tubers to 100° F. for 3 to 4 days. Certain varieties rarely blacken, others often cook black and at present the best assurance of producing non-blackening potatoes appears to be the selection of proper varieties, e.g. Triumph, Chippewa and Sebago, which regularly yield acceptable tubers.

1425. SPARKS, W. C., AND MCLEAN, J. G. 633.491-1.8
The effect of nitrogen, phosphate, and potassium on the yield of Red McClure potatoes as determined by soil analysis and fertilizer application.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 449-57, bibl. 6.
Comparison of results indicates that the "quick-test" method used for testing the alkaline San Luis Valley soils is of value, provided the results of the tests are interpreted so that each element is not only a function of the element tested but is a function of the other elements as well. In order to get the true relationship between the elements the basis for judgment should be plant response rather than chemical tests showing the parts per million of the elements which are extracted by some acid extracting solution. When an acid extracting agent is used, in all probability there is more phosphate and potassium extracted than can be extracted by the plant itself; thus the using of the amounts of these elements extracted by an acid extracting solution as an indication of the fertility of the soil leads to difficulty. But if the soil tests are used to supplement plant response data, then it is possible that a fertilizer balance or ratio can be worked out for given fields on the basis of soil analysis. The following points show that each element is a function of not only the amount of that element present but of the others present also: With the phosphate and potash levels high, an increase in yield occurred when nitrogen was increased from 0 to 40 lb. per acre. Similar results were obtained by soil analysis. In both the soil analysis plots and fertilizer trials all levels of nitrogen and potassium gave an increase in yield when phosphate was increased. With the nitrogen and phosphate levels high, an increase in yield occurred when the amount of potassium applied was increased from zero to 40 lb. per acre. A complete fertilizer gave better yields than was obtained by the addition of any single element alone, or any two elements without the third element being present. [From authors' summary.]—Ft. Collins, Colorado.

1426. FINEMAN, Z. M. 633.491-1.8
The influence of fertilizers on yield and specific gravity of potatoes grown in Alaska.
Amer. Potato J., 1947, **24**: 82-9, bibl. 5.
At Palmer, Alaska, 27 treatments of different combinations of N, P and K fertilizers were given to Arctic Seedling (apparently a strain of Green Mountain) potatoes. Increased yield was obtained with each increase in the rate of each of them. A decrease in S.G. followed each increase in N and K and an increased S.G. that of each increase in P. Amounts applied were combinations of N 15, 30 and 45 lb. per acre and P and K 30, 45 and 60 lb. per acre. Marked differences in S.G. were obtained from fertilizers having different rates of N, P and K.

1427. DAVTJAN, G. S. 633.491-1.8
Manuring summer planted potatoes. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1946, No. 5-6, pp. 38-40.
In view of the limited growing period for summer planted potatoes it is necessary to apply quick-acting fertilizers to hasten ripening and to increase the starch content of the tubers. On coarse carbonated soil with little movement of phosphate, a high application of phosphorus appears to be effective, if in an amount double that of nitrogen, while on coarse non-carbonated soil rich in easily soluble phosphorus the effect can be obtained with less phosphorus. On the coarse soils of the Ararat plain, potash fertilizer had generally little effect, but with summer planted potatoes it showed a positive result. There is significant increase from summer planting with freshly harvested tubers associated with boron fertilizers. In the Ecmiadzin district, manuring increased the percentage of starch in the tubers. On soils rich in phosphorus a positive result was obtained with nitrogenous fertilizers. A particularly high percentage of starch in the tubers was obtained by applying boric acid (4 kg./ha.) on a NPK base.

1428. CARTMILL, W. J. 633.491-1.8
Fertilizing potatoes in the Lockyer Valley.
Qd agric. J., 1947, **64**: 2: 69-74.
A summary of information from soil investigations and field experiments prepared for the guidance of farmers in choosing the right fertilizers for their soils. Certain broad recommendations are made for half a dozen areas.

1429. VAN DER PAAUW, F. 633.491-1.4
Kalitoestand van zand- en dalgrond en opbrengst en onderwatergewicht van aardappelen. **(Potash status of sandy and reclaimed moor soils and yield and underwater weight of potatoes.)**
Versl. landbouwk. Onderz. **51(10)A**, 1945, pp. 193-234, bibl. 14, f. 1.25.

Two series of experiments are described, one with the variety Eigenheimer, the other with Voran. The data set out in graphs show a relation between the potash condition of the soil and the reaction of the crop. The relation proved to be especially close when correction was made for pH and humus content. The underwater weight was dependent on nitrogen fertilizing and the absolute amount of the yield of tubers; at a low potash status the maximum weight was reached with a small, at a high status with a heavy dressing of nitrogen. The underwater weight of Eigenheimer was the higher the greater the yield of tubers, with Voran the opposite was found. The potash content of the tubers of Eigenheimer was found to be closely related to the potash condition of the soil. An injurious effect of manuring with potash on the yield was observed on two very wet fields.

1430. WILSON, A. R., AND OTHERS. 633.491-2.952
Potato haulm destruction with special reference to the use of tar acid compounds.
Ann. appl. Biol., 1947, **34**: 1-33, bibl. 15.

Certain tar acids were nearly as effective as sulphuric acid for killing potato haulm, but only those proving both effective and relatively harmless to the human skin were passed as suitable. An emulsifier, easy to dilute with water of any degree of hardness, was developed. Sodium chlorate gave a fair leaf kill but a poor stem kill and is, therefore, far less effective than sulphuric acid. Di-nitro-cresol derivatives were only moderately effective and have objectionable staining properties. Of the copper compounds tested, copper chloride and nitrate were the most effective, but were not so good as sulphuric acid and were relatively expensive. Tar-oil winter wash was effective, but expensive and slow in action. Young haulm is readily killed; it becomes more resistant as the season advances, but is again susceptible when senescent. Control of blight in tubers is related to the extent of haulm kill obtained by spraying. "Skin setting" of the tubers is accelerated by killing the haulms: to obtain maximum resistance to lifting injury the crop should be left in the ground as long as possible after spraying. Cooking tests with potatoes from various treated plots showed no deleterious effect on quality.

1431. HOYMAN, W. G. 633.491-2.952
Observations on the use of potato vine killers in the Red River Valley of North Dakota.
Amer. Potato J., 1947, **24**: 110-6, bibl. 5.

Of 9 substances tested including ammonium dinitro butylphenol, phosphoric acid and 7 proprietary substances the composition of which is not stated, Weed Killer A, made by the American Cyanamid Company, at 37·5 or 50 lb. per 100 gal. water was the quickest killer. In the absence of dew, dusts were not effective. A discoloration was noticeable in treated and untreated tubers.

1432. HARČENKO, V. 633.4-1.563
Collecting and storing potatoes and root crops intended for seed. [Russian.]
Kolhoznoe Proizvodstvo (Collective Farming), 1946, No. 9-10, p. 24.

The advice is given that as soon as roots and tubers have been lifted, they should be spread in the sun, in order that they may be exposed to the bacteriocidal action of its rays, and should be turned over occasionally. The green tops of the roots must be cut off, leaving a short length of the leaf bases intact. To avoid damage, no special attempt must be made to remove adhering soil. In the clamp, trench, or other storage place, spread roots and friable top-soil (or sand) in alternate layers. The individual roots must not be in contact with each other. Carrots, being the most difficult of the root crops to keep, must be stored only in sand.

1433. SAMUEL, G. G. 633.491-1.563
Some precautions for potato clamping.
Agriculture, 1946, **53**: 312-3.

A plea for dry clamping, towards which the use of copper-containing sprays during the growing season and later burning off the haulm will help. If wet clamping is inevitable, the tubers can often be dried fairly well by covering well with straw during the sweating process before earthing up. The straw, if wet, should be replaced by dry at earthing up. If the tubers are wet, the size of the clamp should be smaller.

1434. DENNY, F. E. 664.84.21
Accumulation of carbon dioxide in potato tuber tissue under conditions for the continuous removal of the exhaled gas.
Contr. Boyce Thompson Inst., 1946, **14**: 315-22, bibl. 5.

Potato tubers previously stored for many weeks at 5° C. were transferred to desiccators and placed at temperatures of 30°, 20°, 10° and 7·5° C. The air surrounding the tubers was kept free of CO_2 by drawing a current of air through the desiccators or, in addition, by absorbing the CO_2 in a layer of sodium hydroxide solution. Determinations of the CO_2 content of the tissues were made at two periods for each temperature. The data obtained showed that CO_2 had increased in the tissues and thus that the rate of production of CO_2 within the tissues becomes greater than the rate at which it can escape into the surrounding air, even when the latter is kept CO_2-free by the aerating and absorbing systems.

1435. BJÖRLING, K. 633.491: 632.1/4+632.8
Inventeringar av växtsjukdomar i odlingar av fabrikspotatis. **(A survey of diseases occurring in Sweden on potatoes grown for starch production.)**
Meddel. Växtskyddsanst. Stockh. **47**, 1946, pp. 16, bibl. 7.

The most important troubles of potatoes grown for starch production in Sweden are: virus diseases, blight, nematodes and manganese deficiency. Losses are very roughly estimated to amount to 10%.

1436. BERGER, K. C., AND GERLOFF, G. C. 633.491-2.19
Stem streak necrosis of potatoes in relation to soil acidity.
Amer. Potato J., 1947, **24**: 156-62, bibl. 4.

Stem streak necrosis was found in the field in Wisconsin when soils were more acid than pH 5·1. The symptoms are described. Greenhouse tests indicate that excess soluble manganese is the cause of the necrosis in potatoes grown on acid soils.

1437. ROLAND, G. 632.8
Sur une microméthode sérologique pour l'étude des viroses végétales. **(A serological micro-method for studying plant viruses.)** [Summary in Dutch.]
Parasitica, 1945, **1**: 106-12, bibl. 8.

The author used a sero-micro-reaction in an investigation of the virus diseases of potatoes, the method being a modification of that described by Stapp (*Mitt. Biol. Reichsanst. Land-u. Forstw.*, 1943, 67: 9). It has proved to be applicable to the investigation of the virus X on all host plants and viruses Y and A of tobacco.

1438. ROZENDAAL, A. 633.491-2.8
Virusziekten van aardappelplanten. **(Virus diseases of the potato.)**
Meded. Inst. Phytopath., **106**, 11 pp., being reprinted from *Landbouwk. Tijdschr.*, 1946, **58**: 533-43.

An historical outline of the discovery of virus diseases of

plants and their cause, and an account of those of the potato.

1439. DENNY, F. E. 633.491-2.8
Non-transference of virus disease in treatments of potato tubers to break dormancy.
Contr. Boyce Thompson Inst., 1946, **14**: 305-13, bibl. 3.
Cuttings from tubers known to be infected with virus disease, mosaic, leaf-roll, spindle-tuber, were mixed with cuttings from disease-free tubers and these lots were then carried through the usual procedure. The results obtained showed no indication that there had been any transfer of virus from diseased to healthy cuttings during the treatment.

1440. FOLSOM, D. 633.491: 632.8
Potato yellowtop and unmottled curly-dwarf in Maine.
Bull. Me agric. Exp. Stat. **446**, 1946, pp. 87-95, bibl. 30.
Neither of the two virus diseases described has so far been serious in Maine, but, as elsewhere, conditions may arise which would greatly increase the damage. Fifteen plates illustrate the symptoms.

1441. MATTHEWS, R. E. F. 633.491-2.8
Status of potato virus B.
Nature, 1947, **159**: 713-4, bibl. 4.
Experimental results suggest that virus B is not a single entity, and that there is no sound basis for giving the strains known as " virus B " any special status within the X group. —Plant Virus Research Station and Molteno Institute, Cambridge.

1442. LIST, G. M. 633.491-2.8
Some relationships of insects to net necrosis of the potato in Colorado.
J. econ. Ent., 1947, **40**: 107-12, bibl. 1.
Net necrosis is similar in symptoms to psyllid yellows, but appears to be associated with aster yellows. Potatoes grown with asters in a cloth fence 3 ft. high were artificially infested with psyllids; the fence afforded protection against the six-spotted leafhopper, *Macrosteles divisus*, and reduced the proportion of diseased tubers and diseased aster blossoms.

1443. ROLAND, G. 633.491-2.753
Contribution à l'étude de la population aphidienne des champs de pomme de terre de diverses régions belges en relation avec la propagation des virus. (**Aphid populations of potato fields in various districts in Belgium in relation to virus distribution.**) [Dutch summary ½ p.]
Parasitica, 1946, **2**: 14-19, bibl. 9.
The results of three years' observations on aphid populations of potatoes in parts of Belgium are described. Of the 7 species of aphids encountered, *Myzus persicae* was the most frequent. With regard to virus distribution there was no great difference in aphid populations between the regions under 500 m. Above that altitude the aphids were always relatively few. It is thus desirable that seed potato production should be concentrated in those regions.

1444. VAN SLOGTEREN, E. 633.491: 632.8
De herkenning van virus-ziekten der aardappelen langs serologische weg. (**The recognition of virus diseases of the potato by serological methods.**)
(*Publ.*) *Inst. Phytopath. Lab. Bloembollenonderz. Lisse* **76**, 1944, pp. 8, reprinted from *Meded. N.A.K.*, 1945, **2**, No. 1.
Describes, with figures, a microscopical agglutination reaction for the detection of the X-virus in potato plants suspected of containing the virus.

1445. KNORR, L. C. 633.491-2.3
Field testing of disinfectants for the control of potato ring rot bacteria [*Corynebacterium sepedonicum*] on wooden and metallic surfaces.
Amer. Potato J., 1947, **24**: 141-50, bibl. 3.
As the result of experiments at East Lansing, Mich., with a number of chemicals including copper sulphate, the author considers that although some of the others give equal control, copper sulphate is preferable owing to its cheapness, its general availability and its applicability to wooden and metallic surfaces. Effective concentrations for wooden surfaces were 1 lb. to 10 gal. water and for metallic 2 lb. to 10 gal. water.

1446. SMITH, M. A., AND RAMSEY, G. B. 633.491-2.3
Bacterial lenticel infection of early potatoes.
Phytopathology, 1947, **37**: 225-42, bibl. 21.
The importance of blemishes and decay of early potato tubers caused by bacterial infection of lenticels is discussed and the various types of injuries are described and illustrated. Isolates from lenticels, soil and soft-rot lesions were morphologically alike and showed only minor variations in their biochemical and physiological characters. They are all considered to be strains of *Erwinia carotovora*.

1447. SKAPTASON, J. B. 633.491-2.3
Studies on the bacterial ring-rot disease of potatoes.
Mem. Cornell agric. Exp. Stat. **250**, 1943, pp. 30, bibl. 45 [received 1946].
Bacterial ring rot of potato, caused by *Corynebacterium sepedonicum*, has gained economic importance in the United States and, owing to its infectious nature, may develop into a menace to the industry. Since foliage symptoms, though characteristic, may not appear or may be masked, tuber symptoms are considered more reliable for a diagnosis of the disease in the field. The only way of preventing the rot is to use clean seed; and this can be achieved by disinfecting seed pieces immediately after cutting, preferably in a 1-1 000 mercuric chloride solution (immersion 10 minutes) which has given good results also for the disinfection of knives, containers and other equipment. Trials on a commercial scale have shown that the use of ultra-violet light for the sorting out of infected tubers (in a darkened room, where a greenish fluorescence appears) involves too high a labour cost to be practical. The biology of the bacterium is discussed.

1448. STARR, G. H. 633.491-2.3
The effect of different concentrations of bacterial suspensions used in inoculations upon subsequent ring rot [*Bacterium sepedonicum*] symptoms in the potato plant.
Amer. Potato J., 1947, **24**: 151-6.
Trials at Laramie, Wyo., in 1945 and 1946 will be continued until adequate information is obtained on the effect of various degrees of inoculum and the period of time necessary to produce plant symptoms.

1449. HOLMBERG, C. 633.491-2.3 +2.651.3
Potatiskräfta och potatisål i Sverige år 1946. (**Potato canker and potato nematode incidence in Sweden, 1946.**)
Växtskyddsnotiser, 1947, No. 1, pp. 5-9.
(1) Potato canker is spreading in Sweden at an alarming rate, but it is hoped that the import of immune varieties from abroad will stop its progress. Trials showed that it takes 15 years of intensive potato growing with immune varieties, before a soil can be considered free from infection. (2) Experiments with DD preparations against potato nematodes are in progress.

1450. CUNNINGHAM, H. S., AND REINKING, O. A. 633.491-2.48
***Fusarium* seed piece decay of potato on Long Island and its control.**
Bull. N. York St. agric. Exp. Stat. **721**, 1946, pp. 32, bibl. 9.

Seed piece decay, caused chiefly by *Fusarium coeruleum* and *F. sambucinum* f. 6, was found to be responsible for poor potato stands on Long Island, reductions in stand rising to 90% in some cases. The fungus causes a dry rot associated with tissue browning, which may not be noticeable on the cut surface. The pathogen is unable to invade uninjured tubers or properly cured seed pieces, but gains entrance through wounds only. Since *Fusarium* spores are carried on soil adhering to healthy tubers, seed treatment of whole potatoes before cutting (with yellow oxide of mercury, 1-30, or Semesan Bel, 1-7½) has proved an effective means of controlling seed piece decay.

1451. VANDERWALLE, R., AND ROLAND, G. 633.491-2.4
Contribution à l'étude du mildiou de la pomme de terre. **(Potato blight.)** [Summary in Dutch.]
Parasitica, 1945, **1**: 43-57, bibl. 14.
From the results of the experiments described the authors conclude that (1) The foliage of the potato varieties Erika, Robusta, B.R.A. 23/31 and B.R.A. 31/33 has shown more resistance to blight (*Phytophthora infestans*) than the ordinary commercial varieties, but none is immune. (2) The tubers of the variety Robusta were most resistant to rot (3) When the other factors of the epidemic potentiality are sufficiently high the variations in the microclimates due to the influence of cultural operations are not enough to influence the degree of infection.

1452. VAUGHN, J. R., AND LEACH, J. G. 633.491-2.411
A comparison of certain potato sprays in different localities in West Virginia.
Amer. Potato J., 1947, **24**: 76-82.
Although in 4 trials in 3 localities Dithane+DDT gave as good results in yield and blight protection as bordeaux+DDT, in a large commercial planting in 1946 the results were reversed. In experimental, non-commercial trials of 12 different materials at one locality the fixed copper (tribasic copper sulphate) and an exploratory chromate compound gave the best protection and yields.

1453. DAVIDSON, R. S., AND RICH, A. E. 633.491-2.411
The performance of new fungicides for controlling late blight on potatoes.
Amer. Potato J., 1947, **24**: 35-9.
Although none of the materials tested in Rhode Island in 1945 and 1946 was so effective as bordeaux, they caused less foliage injury and some, judged by yield, showed much better results than no treatments. These were Phygon, Fermate, Dithane, Zerlate and G.11.

1454. ANDRÉN, F. 633.491-2.411
Besprutningsförsök mot potatisbladmögel 1946. **(Spraying trials against potato blight in 1946.)**
Växtskyddsnotiser, 1946, No. 5, pp. 73-8.
Spraying trials against potato blight were carried out at Åkarp and Nyckelby, Sweden, in order to compare a number of copper oxy and copper oxidul (Cu_2O) preparations with bordeaux. On the basis of equal copper content, that of 2% bordeaux, the performance of the 3 types of compound did not differ greatly. Plots treated with bordeaux gave a yield of 126·1% of the controls, as compared with oxy preparations 131·9% and oxidul preparations 117·6%. In view of several factors, which are discussed, the data do not allow of any conclusion whether fungicidal action against potato blight is determined by the amount of copper residue alone or whether it is also a function of the form of copper compound used.

1455. HORSFALL, J. G., AND TURNER, N. 633.491-2.411
Organic fungicides for late blight in Connecticut.
Amer. Potato J., 1947, **24**: 103-10, bibl. 6.
The dithiocarbamates, especially Dithane, do not appear to be much, if any, better than bordeaux in their control of late blight. They do, however, result in a higher yield, probably owing to their lower phytotoxicity, which is itself due to lower lime content in Dithane.

1456. DYER, R. A. 632.95: 633/634
Protection and classification of plants.
Fmg S. Afr., 1947, **22**: 269-73.
Potatoes. Attention is being given to the possibility of minimizing the harm which an infestation of aphids can do, in the hope that the production of disease-free seed can be undertaken in aphid-infested areas. It is hoped that the same investigation will show how the life of potato stocks can be extended in the high-veld.
The testing of the Empire Potato Collection for resistance to disease and other qualities continued. The indications were promising.
Mangoes. A new inflorescence blight, due to *Physalospora perseae*, caused extensive damage in the E. Transvaal. Control can be effected by spraying or dusting with 50 : 50 sulphur copper mixture.

1457. ANON. 633.491-2.78
The potato moth (*Gnorimoschema operculella*).
Agric. Gaz. N.S.W., 1946, **58**: 81-4.
The potato moth is described and its life-history outlined. Several generations occur during the year and on the cool tablelands the moths may overwinter as pupae; in the warmer coastal districts moth activity continues throughout the winter, though more slowly, on volunteer potato plants and tubers left on the ground and on certain solanaceous weeds. Control measures involve (1) dusting (2%) or spraying (0·1%) with DDT, (2) hilling and deep planting, (3) rotation, only growing potatoes on any particular piece of land every five or six years, (4) clean cultivation, (5) harvesting as soon after lifting as possible, (6) dusting the seed potatoes with 2% DDT. Infested table potatoes may be fumigated with carbon bisulphide in an airtight container.

1458. SMALL, T. 633.491-2.76
Colorado beetle in Jersey, 1939-1946.
Agriculture, 1947, **53**: 450-3.
An account of the progress of Colorado beetle incidence in Jersey from the first outbreak in October, 1939, through the vicissitudes of the war years and the intensive campaign against the pest inaugurated in 1945 to the end of 1946, when the position seemed to be well in hand.

1459. TRUFFAUT, G., AND PASTAC, I. 632.954
Destruction par poudrage des plantes adventices à l'aide de colorants nitrés et destruction des doryphores par le même procédé. **(Weed control and the destruction of the Colorado beetle by dusting with dinitro compounds.)**
Reprinted from *C.R. Acad. Agric. Fr.*, Séance 7 July and 17 November, 1943, pp. 5 [received 1947].
Dusting with 2,4-di-nitro-ortho-cresol, at the rate of 20-30 kg. per hectare, was found to have a good herbicidal effect against charlock and other weeds, especially when carried out at the 3-4 leaf stage. A heavy rain 2-3 hours after application would not affect the rapid herbicidal action. 2,4-di-nitro-phenol proved slightly less effective. In addition to its usefulness as a weed killer, the latter chemical, together with 2,4-di-nitro-6-methyl-phenol, was shown to possess excellent insecticidal properties against the Colorado beetle and other potato pests. An application of either of the two dinitro compounds in the second half of July, at the rate of 20-30 kg. per hectare plus kieselguhr carrier, killed 90-95% of the Colorado larvae and 70-80% of the adults in potato fields. The insecticides act as a stomach and contact poison. Their application is less dangerous than that of arsenicals, as they are decomposed and lose their toxicity under the influence of sunlight.

1460. MUNCIE, J. H., AND MOROFSKY, W. F. 633.491-2.9
Results of spraying and dusting trials with fungicides and insecticides on potatoes. 1938-45.
Tech. Bull. Mich. agric. Exp. Stat. **204**, 1947, pp. 23.

In these trials, which were carried out at Lake City Experiment Station and on growers' potato fields, particular attention was given to the relative effectiveness of the fungicides and insecticides tested in controlling fungal leaf diseases and potato leafhopper. The results are discussed in the form of a progress report, separately for each year. Fixed copper materials were used at dosages approximately equivalent to the metallic copper content of bordeaux mixture. These are the principal results reported for 1945, the last year of the trial, on U.S. No. 1 tubers: "Highest yield was obtained from plots sprayed with bordeaux 8-12-100 plus one pound of DDT followed by Tribasic copper sulfate-sulfur-DDT and Tribasic copper sulfate with only DDT added in varying amounts. DDT added to the spray material gave in all cases increased control of aphids, flea beetles, and leafhoppers. Plots dusted with fixed copper or copper-lime plus DDT gave lower yields than those receiving similar materials. Of the dust materials, Tribasic copper sulfate plus Z 39, rotenone thiocyanate-sulfur or rotenone-sulfur gave outstanding yields."

1461. SITTT, L. L. 633.491-2.951
Promising new insecticides for control of potato insects in western Washington.
Amer. Potato J., 1947, **24**: 116-22.

Dusts containing DDT, 5%; DDD (1,1-dichloro-2,2-bis (p-chlorophenyl)-ethane, 5%; DMT (1-trichloro-2,2-bis (p-methoxyphenyl)-ethane, 5%; and benzene hexachloride, 0·5% gamma isomer, each mixed with CAC (copper A compound = tetra copper calcium oxychloride fungicide), to contain 6·75% metallic copper, were superior to standard calcium arsenate mixture for the control of flea beetles and aphids in 1946 at Arlington, Washington. Results are discussed in some detail. Mechanical injury to potato bines by tractor-drawn dusting equipment reduced yields significantly.

1462. MOROFSKY, W. F., AND MUNCIE, J. H. 633.491-2.951
The use of new insecticides in the control of potato insects.
Amer. Potato J., 1947, **24**: 162-6.

DDT alone or in combination with bordeaux or the fixed coppers, in spray or in dust form—the latter slightly superior against spittle insects, tarnished plant bugs and flea beetles—gave good control of a very abundant potato insect population in 1946 at the Lake City Experiment Station, East Lansing, Mich.

1463. OOSTHUIZEN, M. J. 633.491-2.944
The treatment of potato tubers with carbon disulphide and with para-dichlorobenzene.
Reprinted from *J. ent. Soc. S. Afr.*, 1944, **7**: 100-9, bibl. 12.

It was the object of this investigation to determine the minimum dosage and the correct duration of fumigation for destroying tuber moth, *Phthorimaea operculella*, larvae in potatoes; eggs and pupae were not available at the time. The effect of the treatment on the appearance of dormant potatoes and its influence on dormancy breaking were also studied. Fumigation with CS_2 was carried out in fairly gastight galvanized iron tanks at concentrations of 6, 4 and 2 lb. per 1,000 cubic feet for 48 and 24 hours. All treatments proved effective in killing the larvae, but only the lowest dosage at the two durations did not cause any injury to the tuber. With Up-to-Date, a late variety, CS_2 fumigation at a dosage of 2 and 4 lb. per 1,000 cubic feet was found to stimulate sprouting—the lower concentrations more so than the higher—while the treatment had a delaying effect on the sprouting of Arran Pilot, an early variety. Although much higher concentrations of PDB failed to injure dormant tubers, the use of the chemical is not recommended, because it is not safe for sprouted tubers and moreover imparts a very objectionable and persistent odour to the potato.—College of Agriculture, Potchefstroom.

1464. RAYCHAUDHURI, S. P. 633.524.1-2.8
A note on mosaic virus of sunn-hemp (*Crotalaria juncea* Linn.) and its crystallisation.
Curr. Sci., 1947, **16**: 26-8.

The virus of the sunn-hemp mosaic virus can be transmitted by inoculations with expressed sap, by rubbing, and by the use of carborundum as an abrasive. Anatomical differences are to be seen in the leaf tissues of healthy and diseased leaves. The virus was purified as a colourless solution, from which, after centrifuging and evaporation, fine glassy acicular crystals were obtained. A solution of the purified crystalline preparation gave positive results in inoculation tests on sunn-hemp resulting in typical disease symptoms.

1465. ROMAGNOLI, M. 633.525.1
La ramie. **(Ramie.)**
Relaz. Monograf. agrar. colon. **71**, 1944, pp. 255, bibl. 90 [received 1947].

This monograph is based on prolonged research both in Italy and its former colonies. The propagation, cultivation and harvesting of China grass are described, then follow sections on the extraction of the fibre (with good diagrams of small machines) and its commercial use. A full account of work at the experimental farm of the Instituto Agronomico per l'Africa Italiana is embellished with meteorological and cropping data for the years 1936 to 1940; in some years a third harvesting was possible, and no disease was observed. Later sections deal with the cultivation of ramie in Italy, French North Africa and Tripolitania, and with the climate of Italian East Africa, where small trials have been made.

1466. JAKUSKIN, I. V. (Editor.) 633.525.1
Soviet ramie in Transcaucasia—a collection of articles by different authors. [Russian.]
Published for the All-Union Institute of New Fibre Crops by the Lenin Academy of Agricultural Sciences, Moscow, 1937, pp. 216, 6 rubles [received 1947].

The work contains 14 articles dealing with different aspects of cultivation and with the separation and processing of the fibre. The following subjects are considered: Wild ramie in the Caucasus, pp. 16; soils of the experiment fields in western Georgia, pp. 24; the biology of flowering in ramie, pp. 20; cyto-embryology of the plant, pp. 14; vegetative propagation, pp. 5; breeding, pp. 7; *Phoma boehmeriae* Henn. on white ramie stems, pp. 9; stem structure and fibre properties, pp. 5; distribution of fibre in the stem, pp. 10; anatomical changes during growth, pp. 27; density of fibre layer, pp. 4; decortication problems, pp. 14; degumming of bast, pp. 34; machinery for first stage of processing. [Separate abstracts are available on each of the above on demand.—ED.]

1467. WIGGLESWORTH, A. 633.526.41
***Phormium* fibre (New Zealand flax).**
E. Afr. agric. J., 1947, **12**: 227.

Careful assessment of its value and production costs would be advisable before encouraging large-scale production of this fibre in East Africa. It is produced commercially in New Zealand and also, on a small scale, in the Azores, St. Helena and Argentina, but in none of these countries has it proved particularly successful. In New Zealand exports have fallen from 28,500 tons in 1907 to nothing to-day, while the price of the fibre fell from £36 per ton in 1916 to approximately £16 in 1939. The current New Zealand production of 5,000 tons p.a. is not exported. Despite its advantage in softness over other hard fibres, *Phormium* does not usually command so high a price as

African sisal. It is weaker than both sisal and manila hemp. So far no efficient system has been evolved for stripping the fibre from the leaf; the present method is wasteful and tends to damage the fibres. Notwithstanding subsidies, the industry has not flourished in New Zealand. It has also failed to make progress in St. Helena and the Azores. Unless conditions in East Africa are exceptionally favourable, the long-term prospects for *Phormium* are doubtful. Progress might be made if better varieties could be evolved and an efficient method discovered for stripping the leaf.

1468. Sen, B., and Chakravarti, S. C. 581.143.26.03: 633.544
Vernalization of excised mustard embryo.
Nature, 1947, **159**: 783-4, bibl. 4.

(1) Embryos excised from control and vernalized unsplit seed of mustard (stored at room temperature for 13 months) were sown on 14 April, 1946. Plants from vernalized seeds and plants from embryos excised from vernalized seeds flowered 13·5 and 12·5 days respectively earlier than the controls. (2) In another experiment embryos chilled for different periods and in different media produced plants which flowered significantly earlier than plants from control embryos. The results prove that (1) the embryos of vernalized unsplit mustard seeds will retain the induced vernalization for more than a year and (2) the cotyledons of mustard seeds are not involved in the process of vernalization.—Vivekananda Laboratory, Almora, India.

1469. Hyde, W. C. 633.71(931)
History of tobacco growing in New Zealand.
J. roy. N.Z. Inst. Hort., 1946, **15**: 2: 1-5.

Tobacco has been grown in New Zealand from the earliest days of settlement, the Maoris being quick to recognize and appreciate its qualities, and settlers in various parts of the country have grown it for their own use. But its cultivation on a commercial scale is a comparatively recent venture. It started near Hastings, where tobacco leaf for pipe smoking was manufactured during the first decade of the present century. More recently attempts were made to produce the silky leaf suitable for cigarettes. By 1925 about 300 acres were under tobacco, producing a quarter-million pounds weight. At this time Great Britain granted a preferential duty to Empire-grown tobacco leaf, and this led to a boom in tobacco growing in New Zealand, many companies being formed for the production and manufacture of the leaf. In 1926 the New Zealand Department of Agriculture appointed a Tobacco Instructor and experiments were carried out in many districts. In 1937 a tobacco research station was established at Riwaka where local problems have been studied in collaboration with the Cawthron Institute.

1470. Brieger, F. G., and Forster, R. 633.71: 581.169
Modificação da dominância em *N. tabacum petiolaris*. **(Modification of dominance in *Nicotiana tabacum petiolaris*.)**
Reprint from *Rev. Agric. S. Paulo*, 1943, **18**: 446-7.

A brief note on the genetics of the petiolate form of *Nicotiana tabacum*. In some crosses this character was dominant, in others recessive.

1471. Dobrunov, L. G. 633.71: 581.14
Ontogenetic and metameric variation in tobacco leaves.
C.R. Acad. Sci. U.R.S.S., 1946, **54**: 549-52.

Catalase activity was studied in tobacco plants of all the leaves on the plant from the 2nd to the 18th tiers throughout the growing period, from the young plantlets in June to the maturing of seed at the end of August. The fresh weight of leaves regularly varies with different developmental phases, following a complete age curve with ascending and descending branches. All the curves of ontogenetic variation in the weight of the leaves belonging to different tiers are identical, i.e. they all have one ascending branch. Metameric variation of catalase activity in the leaves is governed by a definite rule. High activity at the initial phases is replaced by low activity along with the development and with the ageing of the organism and of its parts. Metameric variation is represented by curves of two types, by the complete age curve at the initial phases of development, and by the curve possessing only an ascending branch after the beginning of flower bud formation. Ontogenetic variation in the catalase activity makes it possible to distinguish among the 17 tiers studied, 4 groups differing in the type of age curve.

1472. Steinberg, R. A. 633.71: 577.17
Suppression of axillary growth in decapitated tobacco plants by chemicals.
Science, 1947, **105**: 435.

An inexpensive substitute for the operation of suckering, without detriment to quality or yield, would be of practical importance to growers. With this objective in view greenhouse trials were undertaken using various chemical compounds including growth substances for suppressing axillary growth. The results indicate that it may be economically feasible to employ chemical suppression of suckers in the production of tobacco.

1473. Wenusch, A. 633.71-1.57
Mogelijkheden ter verbetering van rooktabak door geëigende maatregelen bij oogsten, drogen en fermenteeren. **(Improving smoking tobacco by appropriate means when harvesting, curing and fermenting.)**
Meded. Direct. Tuinb., 1947, **10**: 42-8.

The different tastes of smokers and the various types of tobacco required, e.g. for cigars and for cigarettes, make it impossible to lay down general processing principles. Observations indicate that the numerous brands of tobacco can be divided, according to the reaction of the primary smoke (that inhaled from the burning tobacco during smoking, as distinct from the subsidiary smoke which issues from glowing tobacco between puffs), into an acid and an alkaline group. The tobaccos of the acid group (e.g. most oriental tobacco) have an acid-reacting, primary smoke, in distillation with distilled water they give off an acid-reacting, nicotine-free vapour, and they contain sugar and chlorogene acid. The tobaccos of the alkaline group (e.g. Havana, Brazil and Cuba tobacco) have an alkaline-reacting primary smoke, in distillation they give off an alkaline-reacting, nicotine-containing vapour, and they contain neither sugar nor chlorogene acid. The differences between the two groups is not due to botanical differences but to the time of picking the leaves. Leaves actively assimilating when picked, dry in 4 to 6 weeks, while leaves that are losing their vitality when picked dry more quickly. In considering improvements in tobacco five essentials, as affecting the quality, must be borne in mind: (1) the genotype of the plant, (2) its phenotype, (3) the degree of vitality of the leaves when picked, (4) the method of curing, (5) the method of treating the dried tobacco (after-ripening, fermentation). Their effect on the final product is discussed.

1474. Dijkstra, S. P. 633.71: 581.192
Het nicotinegehalte van tabak. **(The nicotine-content of tobacco.)** [English summary 4 lines.]
Meded. Direct. Tuinb., 1947, **10**: 22.

Samples of 11 varieties of *Tabacum nicotianum* were tested for their nicotine content, which was found to vary from 0·41 to 0·65%. Nutrition is considered to be more important for nicotine content than selection. The author pleads for uniformity in methods of chemical analysis.

1475. CAPLIN, S. M. 633.71: 578.08
Growth and morphology of tobacco tissue cultures in vitro.
Bot. Gaz., 1947, **108**: 379-93, bibl. 24.
Tobacco stem callus tissue was grown in darkness, on nutrient agar, over a period of 9 weeks. The cultures increased in size by the proliferation of small knoblike protuberances in which division and enlargement of cells occurred very close to the surface. Knobs increased in size by cleavage and by the formation of new growing centres in the sub-surface of older knobs.

1476. ALLARD, H. A. 633.71: 612.014.44
Photoperiodic behavior of Maryland Mammoth tobacco under localization treatments and in grafts with Connecticut Broadleaf.
J. agric. Res., 1947, **74**: 15-31, bibl. 18.
Plants of Maryland Mammoth tobacco were subjected to short photoperiods favourable to flowering, by darkening them with light-proof cases. In one test the outside branch was kept defoliated. There was no indication of hastening flowering in any of these tests. Grafts were made between short-day Maryland Mammoth variety and the day-neutral Connecticut Broadleaf, both being used as stock or scion. Some of the Maryland Mammoth branches were kept defoliated for many weeks and one was defoliated and wrapped with black cloth to determine whether such branches would flower earlier than untreated branches in similar grafts. There was no indication of transmission of a flowering stimulus from the flowering Connecticut Broadway stems (donors) to the defoliated or darkened Maryland Mammoth stems (receptors). In most instances there appeared to be delayed flowering in these treated stems.

1477. VEN, R. V. D. [WENUSCH, A.] 633.71
De kleurstoffen van de tabak. **(Tobacco pigments.)**
Meded. Direct. Tuinb., 1947, **10**: 94-8.
This paper, based on an article by Dr. A. Wenusch, is an account of the changes in chlorophyll content of tobacco leaves during the growing period and of the colour changes the leaves undergo as they approach maturity, e.g. the oxidation of carotene to form the yellow pigment xanthophyll, and the relation of these changes to the curing processes. The discussion goes to show that the typical tobaccos of the "acid" group are more or less yellow, while the colour of those of the "alkaline" is brownish.

1478. MCMURTREY, J. E., Jr. 633.71-1.811.6
Effect of magnesium on growth and composition of tobacco.
Soil Sci., 1947, **63**: 59-67, bibl. 39.
The characteristic symptoms of magnesium deficiency in tobacco were known as "sand drown" before the cause was known. Loss of colour begins in the lowermost leaves of the plant and at the tips of affected leaves. It advances along the margins and inwardly between the veins of the leaf, and, as the disease increases in severity, it advances progressively from the lower leaves upward. The larger veins of the leaf tend to retain their green colour except in severe cases. As a rule, the growth relations of the different organs and tissues of the plant are not greatly disturbed, and affected leaves tend to remain smooth and show little tendency toward speckling or development of dead spots. Even in severe magnesium hunger the plant is able to flower and develop seed. When leaf tobacco contained about 0·15% magnesium, deficiency symptoms were usually evident, whereas leaves containing 0·25% were generally free from symptoms. Magnesium deficiency is commonly most evident on light sandy soils and after excessive rain. On such soils an application of 12 lb. of available magnesium has been found to be sufficient to correct the deficiency, but when magnesium limestone is the source much larger quantities are required.

1479. TAKAHASHI, W. N., AND RAWLINS, T. E. 633.71-2.8
An electron microscope study of mutation in tobacco-mosaic virus.
Phytopathology, 1947, **37**: 73-6.
A yellow mutant of common tobacco-mosaic virus was indistinguishable from the parent strain when examined with the electron microscope. It is concluded that mutations of rod-shaped viruses are ordinarily not accompanied by a modification of the virus particle sufficiently great to be detected by the electron microscope. If an unidentified virus has the particle size of a known rod-shaped virus it is very likely that the two viruses are related.

1480. BRIEGER, F. G., LIMA, A. R., AND FORSTER, R. 633.71-2.8
Comportamento de variedades e progênies de fumo na resistência ao "Vira-Cabeça". **(The behaviour of varieties and progenies of tobacco in relation to resistance to spotted wilt.)**
Bragantia, 1942, **2**: 275-94.
In the trials described great homogeneity was found to exist between different lines of the Sumatra and Virginia types tested, and the prospect of improving them by selection is slight, both with regard to the vegetative characters studied and to disease resistance.

1481. BAWDEN, F. C., AND KASSANIS, B. 633.71-2.8
***Primula obconica*, a carrier of tobacco necrosis viruses.**
Ann. appl. Biol., 1947, **34**: 127-35.
A tobacco necrosis virus has been isolated from the leaves and flowers of naturally infected *Primula obconica* plants which showed no symptoms. It is not distributed uniformly through primulas, but occurs only in isolated regions, most of the tissues being apparently virus-free.—Rothamsted.

1482. CLAYTON, E. E. 633.71-2.3
A wildfire-resistant tobacco.
J. Hered., 1947, **38**: 35-40, bibl. 7.
In a large-scale cross of *Nicotiana tabacum* × *N. longiflora* tetraploids, most of the progeny were sterile; one plant produced self-sterile shoots from callus tissue, and from the back-cross with *N. tabacum* TL 106 was selected, homozygous for resistance to wildfire (*Pseudomonas tabaci*) and blackfire (*P. angulata*). TL 106 is similar to commercial tobacco in growth. Seed is available for research workers.—Division of Tobacco, Medicinal and Special Crops, Bureau of Plant Industry, U.S.D.A.

1483. MCKINNEY, H. H. 632.8: 633.71
Stability of labile viruses in desiccated tissue.
Phytopathology, 1947, **37**: 139-42.
Virus-infected leaves were dried in free air and in desiccators, then stored in bottles and later tested. The viruses studied included those of cucumber mosaic, celery mosaic, tobacco ring spot, potato "Y"-mosaic and tobacco etch. They became inactive in from a few days to a few weeks when the tissues were dried in the ordinary manner in the laboratory; they retained their stability for much longer periods when the tissues were dried quickly in desiccators.

1484. BRIEGER, F. G., AND FORSTER, R. 633.71-2.8
Tumores em certos híbridos do gênero Nicotiana. **(Tumours in certain *Nicotiana* hybrids.)**
Bragantia, 1942, **2**: 259-74, bibl. 16.
The tumours in two interspecific *Nicotiana* hybrids, *N. glauca* × *N. langsdorffii* and *N. glauca* × *N. sanderae*, are quite different. In the former the plants are at first quite normal and vigorous, while tumours and other proliferations arise fairly frequently on the older plants; leaf tumours are rare. The plants of the other cross remain weak and rachitic, and form large galls early at the base of the stem and on the root. A histological study was made of the origin of the tumours. On the stems they are endogenous and start from mature, not meristematic, cells. The cause of these galls is unknown.

1485. GRAHAM, T. W., AND OTHERS. 633.71-2.4
Organic compounds for control of tobacco blue mold.
Phytopathology, 1947, **37**: 125-38.
In the experiments described, for the control of tobacco blue mould (*Peronospora tabacina*), bismuth subsalicylate was highly effective, and benzyl salicylate, acetyl salicylate, salicamide, salicylic acid, and sodium salicylate gave better control than copper oxide-oil. Certain derivatives of benzoic acid, especially benzoyl peroxide, were fungicidal. Fermate gave effective control in commercial beds. Bismuth subsalicylate and Fermate both gave good results as dusts. Combinations of zinc salicylate with Fermate, Thiosan, and Spergon were more effective than any of the components used alone.

1486. TENHET, J. N., AND BARE, C. O. 633.71-1.56
Redrying of tobacco and its effect on insect infestation.
J. econ. Ent., 1946, **39**: 607-9.
Commercial redrying of flue-cured leaf tobacco to 10-11½% moisture completely kills all stages of the tobacco moth, *Ephestia elutella*, and the cigarette beetle, *Lasioderma serricorne*. Control may not be complete in drying stem tobacco.—Richmond, Va.

1487. SALMON, E. S. 633.79
Thirtieth report on the trial of new varieties of hops, 1946.*
East Malling Research Station, Maidstone, Kent, 1947, 16 pp., 1s.
Of the 119 new varieties tested, one (Bullion Hop) cropped at the rate of 30 cwt. per acre, four at 25 to 28¼ cwt., and twenty-two at 20 to 24¼ cwt. The number of bushels of green hops required to the cwt. of dried hops varied from 52 to 155. Although English hops generally in 1946 gave a low P.V., a number of the new varieties gave high analyses, the variety Northern Brewer being outstanding. A bud-sport of Nonsuch Hop was richer than its parent in soft resins by 1·27% α-acid and 0·93% β-resins. The brewers' requirements for the new varieties are increasing and in order to meet the demand the acreage will have to be greatly increased. The need for an experimental station in the Weald is repeated. Many of the new varieties can be picked with a higher efficiency than the ordinary commercial varieties, and notes are given on the characteristics of the varieties that render them suitable for machine-picking.

1488. SALMON, E. S., AND BURGESS, A. H. 633.79: 663.4
Reports received from brewers on recent brewing trials with certain new varieties of hops. II.
J. Inst. Brew., 1947, **53**: 100-10.
The reports were favourable in 17 trials out of 22. From a knowledge of the P.V. of the hops a reduction in the amount of hops used by a brewer has been found practicable. The comparative keeping properties of hops are discussed and some analytical data are given.

1489. PEARCE, S. C., AND BEARD, F. H. 633.79: 663.4
A study of variation in preservative value of hops.
J. Inst. Brew., 1946, **52**: 250-5, bibl. 6.
During 1944 and 1945 the Preservative Value (P.V.=10 times the percentage of α-resins) of the Fuggle hop grown at East Malling was studied to find out how it varies, the cause of the variation and how accurately it can be measured. The largest difference found was seasonal, 60 units in 1944, 39 in 1945. Two clones showed consistent differences: A had a P.V. of 46·5, while that of N was 52·5. There were consistent differences, up to 9 units of P.V., in hops taken from different parts of the same small hop garden, less than an acre in size. Some of the individual hills gave outstanding high P.V.s in both seasons, others low ones. If a sample is taken from a single hill, the P.V. of the clone to which that hill belongs can be estimated within reasonable certainty to within 17%, but if the garden contains a mixture of clones several samples would have to be taken to estimate the average for the garden with the same accuracy. If single samples are cut from pockets no difference should be accounted real if it is smaller than 14%.

* For abstracts of reports 1942, 1943, 1944 and 1945, see *H.A.*, 16: 257 and 17: 512.

1490. GLOBIN, P. 633.822-1.56
The effect of curing on the synthesis of ethereal oils in peppermint. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1945, No. 11-12, pp. 33-5.
The synthesis of ethereal oils in peppermint during curing takes place over a period of 4 days with an atmospheric moisture of 30-50%; after that time there is a sharp diminution of ethereal oils. The increase in the amount of ethereal oils occurs only in leaves not removed from the stems and attains to 60% in relation to controls. During curing the carbohydrates are used in the first place for the process of respiration. The synthesis of ethereal oils in peppermint during curing is probably brought about at the expense of the nitrogenous compounds.

1491. IVANOV, S. L. 633.85
Oil formation in plants. [Russian.]
Adv. mod. Biol., 1946, **22**: 181-96, bibl. 25.
The author reviews the biological problems involved in the investigations of plant oils, with particular reference to the plants yielding oils in U.S.S.R., under these subjects: (1) The initiation of oil-formation in the plant; (2) The course of the oil-production process in each plant species in its ontogeny; (3) The course of the oil-production process in various species within the limits of the genus or of the family (in phylogeny), the theory of the physiological-chemical characters of the plant; (4) The climatic theory and plant variation; (5) The problem of intermediate substances in biochemistry; (6) Biochemical processes in the fertilization of plants and in grafting; (7) The application of Mičurin's methods to oil-producing plants, and the aims of future research.

1492. STEVENSON, E. C. 633.853.55: 632.4
The effect of seedling diseases of castor beans on the subsequent plant development and yield.
Phytopathology, 1947, **37**: 184-8.
Cotyledonary infections by various fungi on castor-bean plants have a pronounced effect on the seedling plant growth; the affected seedlings are either retarded in growth or are killed. The quality of the seed from infected plants did not appear to be affected, in that there was no significant reduction in either the hulling percentage or weight per bushel.

1493. KOLESNIKOV, A. I., AND KOVERGA, A. S. 633.88
Valuable medicinal plants of the Caucasus: *Scopolia caucasica* [pp. 11-52, bibl. 53, English summary ½ page], ***Valeriana colchica*** [pp. 53-73, bibl. 14, English summary ½ page] **and *Digitalis ferruginea*** [pp. 64-91, bibl. 10, English summary ½ page]. [Russian.]
Mem. Molotov State bot. Gdn, Nikitsk., **23**, 1944.
Scopolia caucasica Kolesn. is separated as a new Caucasian species with seven forms. Alkaloid contents are given for the various forms, for different parts of the plant, age and season of collection, and for different methods of processing. There are notes on the use of scopolia [=hyoscine ?]. *Valeriana colchica*: 12 forms are described, whose yield of oil of valerian can be predicted from anatomical studies. *Digitalis ferruginea*: 10 Caucasian forms are separated on foliar characters. The distribution of all species is described, and the economics and cultivation of the first two are discussed.

1494. Sokolov, V. S. 586.62: 633.88
The dynamics of alkaloid accumulation in certain *Chenopodiaceae*. [Russian.]
A symposium on scientific work carried out at Leningrad 1941-43, 1946, pp. 291-8, bibl. 41. Komarov bot. Inst. Acad. Sci. U.S.S.R., Leningrad.

This is mainly a review of the literature on the subject; but some of the author's own experiments carried out in Central Asia with *Salsola richteri*, *S. paletzkiana* and *S. subaphylla* are also described. It is pointed out that the alkaloid content in various forms of the same species belonging to the *Chenopodiaceae* family may vary a great deal. Thus, certain forms of *S. richteri* contain very small amounts of salsolin, measured in one thousandth fraction of one per cent. There have, however, been found other forms with about 2% of this alkaloid. It is still unknown whether the existence of forms with a low or a high alkaloid content is due to hereditary or environmental factors. While the cultivation of plants with high alkaloid content may be of benefit to the pharmaceutical industry, the discovery, for example, of *Anabasis aphylla* forms without alkaloids will extend the range of valuable forage plants. The formation and accumulation of alkaloids in *S. richteri*, *S. paletzkiana* and *S. subaphylla* are described.

1495. Beljdenkova, A. F. 633.88: 581.036+581.035
The effect of temperature and light regulation on the growth and development of certain medicinal plants. [Russian.]
A symposium of scientific work carried out at Leningrad 1941-43, 1946, pp. 233-7. Komarov bot. Inst. Acad. Sci. Leningrad.

Experiments were made with *Digitalis purpurea*, *Atropa belladonna*, and *Lobelia inflata* to determine (1) the influence of different temperatures on the rate of seed germination; and (2) the influence of light and temperature on the accumulation of leaves of these plants. The seeds of *A. belladonna* germinated in 4-5 days when grown at 30-35° C., but failed to do so at a temperature below 16° C.; whereas the other two plants germinated quickly at 16-18° C., though the process was retarded at lower temperatures. The plants grown in the hothouse at 18-25° C. gave a greater yield of leaves and developed more quickly than those planted in the open ground and grown at 3-15° C. *D. purpurea* and *L. inflata* grown under a reduced, i.e. 10-hour, day, were taller and had more leaves than those grown under normal day conditions.

1496. Dickson, B. T., and Hartley, W. 633.913
Rubber-growing in Australia.
Reprinted from *Trans. Inst. Rubb. Ind.*, 1946 (?), **22**: 17-24, bibl. 3.

A paper read before the Australasian Branch in Sydney on 27 August, 1945. The ground covered includes: rubber production in Papua; initiation of research in Australia; rubber-producing plants, including *Cryptostegia grandiflora*, kok saghyz and guayule; and finally economics and prospects. It is concluded that rubber-growing is not yet economically possible in Australia.

1497. Belikov, P. S., Lipman, B. L., and Oleinikova, I. I. 633.913
A contribution to physiological and biochemical characteristics of improved forms of kok-saghyz.
C.R. Acad. Sci. U.R.S.S., 1946, **54**: 541-4.

Comparative tests were made of material from (1) plantation kok saghyz, (2) variety 485, and (3) Navashin's tetraploid (*H.A.*, 16: 877), relating to enzymic synthesis and breakdown of saccharose, accumulation of sugar and growth of roots, and the results were tabulated. No. 485 is late maturing, the tetraploid early maturing. Sugar content formed the series No. 485 < plantation < tetraploid. The relatively low sugar content of No. 485 is connected with the reduced polysaccharide fraction (inulin + hemicellulose). The ratio monosaccharides/saccharose in the leaves of the varieties compared is in full agreement with the trends of the enzymic processes; in the tetraploid varieties the indices monosaccharides/saccharose and breakdown/synthesis are higher than in variety No. 485.

1498. Scarth, G. W., Gooding, H. B., and Shaw, M. 633.913
Factors influencing growth and summer dormancy in *Taraxacum kok-saghyz*.
Canad. J. Res., 1947, **25**, Sec. C, pp. 27-42, bibl. 5.

Kok saghyz, after a peak of flowering, passes into a period in which growth is greatly reduced and sensitivity to unfavourable conditions is greatly increased. This phase can be delayed but not eliminated by the removal of flower buds. In trials at the Macdonald College, Quebec, various external conditions had no appreciable effect on its onset. Watering affected rosette diameter more markedly than it did root weight; disbudding affected both to approximately the same extent. Shading was not beneficial to growth.

1499. Bannan, M. W. 633.913
Tetraploid *Taraxacum kok-saghyz*. III. Achene weight, flowering, and plant development.
Canad. J. Res., 1947, **25**, Sec. C, pp. 59-72, bibl. 11.

The ultimate size of diploid or tetraploid kok saghyz plants was not determined primarily by the weight of the achenes from which they originated, and large or small tetraploids when crossed among themselves did not produce achenes reflecting the differences in plant size. Tetraploids have larger organs than diploids but are notably deficient in the production of inflorescences during the first year. The root size of the vegetating tetraploids tends to surpass that of the more floriferous diploids, unless these are disbudded. On the whole, first-year plants with the broadest and leafiest rosettes and few or no capitula developed the biggest roots.

1500. Neĭman, G. B., and Avsaragov, A. H. 633.913
Productivity of kok-saghyz plants with large-sized roots. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1947, No. 1, pp. 16-19, bibl. 4.

Trials were carried out with a selection of kok saghyz, No. 485, sown in rows without spacing. This hindered increase in size of the roots, yet the roots were significantly larger and the yield of caoutchouc higher in comparison with improved selections. Moreover, No. 485 ripens late, and is characterized by an autumnal increase in size of roots and in caoutchouc. It is thus recommended for those regions where kok saghyz, when grown as one-year plants, cannot be harvested early.

1501. Medvedev, P. 633.913
Three harvests of tau-saghyz roots from a plantation. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1945, No. 11-12, pp. 17-20, bibl. 3.

The readiness with which tau saghyz regenerates its tissues allows three crops of roots to be taken from one plantation. The roots are cut off at depths of 14-15, 16 and 18 cm. at the end of the first, second, and third years respectively. During that time the roots regenerate and new shoots are produced. The yield in the second year is almost twice that from 2-year-old seedling plants. Plants so treated are said to be more resistant to pests and fungal diseases.

1502. Kedrov-Zihman, O. K., and Stankov, N. Z. (Editors). 631.8: 631.411.4
The application of fertilizers to boggy soils. [Russian.]
Publ. Lenin Acad. agric. Sci. U.S.S.R., 1940, pp. 40 [received 1947].

Various aspects of Russian bog soils are described by a number of authors with reference to the application of manures, particularly for hemp and kok saghyz.

1503. Baranova, E. A. 633.913
Variation of shape of nuclei in the laticiferous vessels of tau-saghyz (*Scorzonera tau-saghyz* Lipsch. et Bosse).
C.R. Acad. Sci. U.R.S.S., 1946, **54**: 825-7.
Variations in the shape of the nuclei in the laticiferous system of tau saghyz were observed. In the pericycle the variation was from spherical to spindle-shaped. In the cambial region the nuclear variations were (1) spindle-shaped, (2) spindle-shaped with rounded ends and often bent, (3) long and bent, and (4) spiral-shaped.

1504. Maštakov, C. M. 633.913: 581.144.2
Comparative root size of flowering and non-flowering kok-saghyz plants. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1946, No. 5-6, pp. 23-7.
The author reviews former work showing that non-flowering plants of kok saghyz in their first year have certain advantages over flowering plants; they contain a somewhat higher percentage of certain substances and they show a higher degree of polymerization of caoutchouc. Moreover, in unthinned sowings the flowering plants in their first year are said to develop better and produce larger roots, but only under conditions of non-thinning and lack of uniformity. In plantings sufficiently thinned and under good conditions for growth, the non-flowering plants in general had relatively larger roots than the flowering plants. He follows this up with further data showing that the closer the plants are in the rows the greater is the difference between the weight of the roots of flowering and of non-flowering plants. When the distances between plants was 25×44·5 and 35×35 cm. there was no significant difference in the root weights of flowering and non-flowering plants. He criticizes the conclusions of those workers who based results on the diameter of the upper end of the roots as a criterion of size and goes on to show that the diameter of the roots is not always correlated with weight. Further data indicate that under favourable conditions the roots of non-flowering plants may be greater or less than those of flowering plants according to the variety tested.

1505. Jahontov, V. V., and Stovicek, L. N. 633.913-2.73
Two new pests of krym-saghyz (*Taraxacum megalorhizon* Hand-Mzt.). [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1946, No. 5-6, pp. 41-3.
In Uzbekistan (Tashkent district) two species of thrips not hitherto recognized as pests have attacked krym saghyz. One of them appears to be a species not yet recorded, shortly to be described under the name of *Thrips taraxaci* Jakh.; the other is *Taeniothrips frici* Uzel. As a result of tests the authors recommend for control anabasin sulphate (0·3% nicotine) and 1·2% soap.

1506. Traub, H. P. 633.913: 581.192: 578.08
Method for separating root tissue from root-gravel mixtures.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 347-50, bibl. 5.
The writer describes a procedure based on static electricity and gravity for recovering the new roots formed in guayule during experiments aimed at determining the function of the rubber hydrocarbon (caoutchouc) in that plant. Only simple apparatus is necessary.

1507. Gardner, E. J. 633.913: 581.162.3
Insect pollination in guayule, *Parthenium argentatum* Gray.
J. Amer. Soc. Agron., 1947, **39**: 224-33, bibl. 13.
The results of field and greenhouse experiments indicate that certain insects, particularly ladybirds, lygus bugs and cucumber beetles, are effective carriers of guayule pollen from one plant to another. Flies, except one species of fruit fly, produced no significant effect in the experiments.

1508. Tingey, D. C., and Foote, W. 633.913
Effect of plant spacing, fall irrigation, and fertilization on rubber production during the winter in 1-year-old guayule.
J. Amer. Soc. Agron., 1947, **39**: 234-9.
The maximum rubber production by one-year-old guayule during the winter was obtained with the closest spacing, fall irrigation, and the application of fertilizers.

1509. Romney, V. E. 633.913-2.754
Control of lygus bugs with DDT as related to guayule seed production.
J. econ. Ent., 1946, **39**: 664-5, bibl. 5.
Five applications of 2·5% DDT dust at 30-35 lb. per acre controlled two generations of *Lygus hesperus*, and improved seed production in guayule. There was no residual effect on nymphs hatching after treatment, so that a second dusting was required 10 days later.—Salinas, Calif.

1510. Siddiqui, R. H., and Mathur, M. L. 633.913
***Cryptostegia grandiflora*: suitability of the plant for composts and other purposes.**
Indian Frng, 1946, **7**: 397-401.
The writers advocate the extended use of this rubber-vine for various purposes. It has certain advantages over *Hevea* as a source of rubber, though its yield is much lower. It can be grown over a wide range of climatic and cultural conditions and can be tapped after one year. The method of collecting the latex—in glass or bamboo tubes—is described and illustrated.

1511. Curtis, J. T. 633.913: 581.145.2
Some factors affecting fruit production by *Cryptostegia*.
Amer. J. Bot., 1946, **33**: 763-9, bibl. 14.
Fruit production was investigated in *Cryptostegia grandiflora* and *C. madagascariensis* and their F_1 hybrid. Both flowers and fruit were produced throughout the year, but maximum flowering was in summer. Greatest reproductive efficiency of the flowers occurred at field spacings of 540 plants per acre, highest acre yields at 1,940 per acre. Both grafted and non-grafted plants that were of *C. grandiflora* stock exceeded those of *C. madagascariensis* stock in flower and fruit production. Pollination is largely by butterflies. The only cases of natural parthenocarpy found were in certain clones that had no anthocyanin. Dry weight production of flowers and fruit amounted to 12·3 tons per acre per year for hybrid plants grafted on *C. grandiflora* stocks.

1512. Hallock, H. C. 635.11: 632.754
Beet leafhopper selection of bean varieties and its relation to curly top.
J. econ. Ent., 1946, **39**: 319-25, bibl. 12.
In south-central Idaho beet leafhoppers preferred garden beans to a field bean; there were significant differences between their choice of garden varieties. In years when leafhoppers are expected, losses due to curly top may be reduced by planting varieties less well liked by them.

1513. Sweet, R. D., Kunkel, R., and Raleigh, G. J. 635.13: 632.954
The value of several petroleum products as selective sprays for weeding carrots.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 475-7.
In tests in New York State, dry cleaning fluids containing 10-15% aromatics by volume proved best against carrot weeds, causing no injury to the carrots, leaving no residue and giving practically no objectionable flavour to the carrots.

1514. Ščeglova, O. A. 577.16: 635.15+635.52
The influence of short day on the formation and amount of vitamin C in certain vegetables. [Russian.]
A symposium of scientific work carried out at Leningrad, 1941-43, 1946, pp. 245-51; bibl. 5. Komarov bot. Inst. Acad. Sci. U.S.S.R., Leningrad.

An account is given of experiments carried out in the summer of 1942 with one variety each of radish and lettuce. Three groups, with 10 radish plants in each, were subjected to a 10-hour day for 10, 15 and 25 days between 30 May and 8 July. In general, the short-day plants had larger roots and smaller stems and flowered later than the controls. The vitamin C content in the leaves of treated plants was less than in those of controls, but its content in the roots was more. The explanation given is that in the absence of flowering and backwardness in stem development the assimilated nutrients were transported from the leaves into roots where they were used up for the synthesis of vitamin C. Under similar experimental conditions the leaves of the short-day lettuces had 32·3% more vitamin C than the controls, and flowering in the latter occurred 1·5 months earlier than in the former. A 37% increase in the vitamin C content was found in lettuce plants grown for 2 days in red light rays only.

1515. Smith, F. G., Link, K. P., and Walker, J. C. 632.42
Acidic and phenolic fractions of crucifer roots in relation to clubroot.
J. agric. Res., 1947, **74**: 193-204, bibl. 25.

The suspected significance of phenolic or acidic constituents of root tissues in resistance to clubroot of crucifers was investigated by phenol and acid analysis and toxicant fractionation. The results did not show that resistance to clubroot of crucifers was due in any large part to the presence of pre-formed extractable phenolic or acidic fungicidal constituents in the cortical tissues of the fleshy roots.

1516. Tincker, M. A. H. 635.25
Home-grown onion sets.
Agriculture, 1947, **54**: 26-30, bibl. 7.

The author's short report shows that the production of home-grown onion sets is feasible and that the sets, well ripened and graded as to size, produce good crops.

1517. Plinka, A. D. 635.25: 631.523
Methods of artificial crossing of onion. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1946, No. 11-12, pp. 25-7.

The author discusses the difficulty of obtaining seed in quantity from onions and then describes a method found to be successful. The seed plants are set out in double-row strips, the distance between plants in the rows and between the two rows of a strip being 20 cm., and between the strips not less than 60 cm. When the flowers are about to open, inflorescences of neighbouring plants are brought together under a parchment cylinder (for 2 inflorescences the size is 20×15 cm.) which is closed below the inflorescences with string, a ring of cotton wool being enclosed to protect the stems and to keep out creeping insects. The pollination is done with a brush which is moved round within the "isolator" cylinder; the upper end of the isolator is then closed and left until the seeds begin to ripen, when the heads are cut off, collected into small bundles of the same pollination combination, and hung up to dry in muslin bags.

1518. Berger, C. A. 577.17: 635.25
Cytological effects of combined treatments with colchicine and naphthalene-acetic acid.
Abstr. *Amer. J. Bot.* 1946, **33**: 817-8.

Describes the effect of colchicine and of naphthaleneacetic acid, separately and in combination, on cell division in *Allium* root meristem.—Fordham Univ., N.Y.

1519. Stuart, N. W., and Griffin, D. M. 635.25: 631.8: 631.531
The influence of nitrogen nutrition on onion seed production in the greenhouse.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 398-402, bibl. 2.

Maximum seed yields were obtained by varying the nitrogen content of the culture solution, growing on high N until 1 January, then on low N for 2 months, and then on high N again.—Beltsville, Md.

1520. Hawthorn, L. R. 632.13: 635.25
Defoliation studies as a basis for the estimation of hail losses [in onions].
Bull. Tex. agric. Exp. Stat. **682**, 1946, pp. 22, bibl. 10.

Since it has proved difficult to assess hail damage to onions caused by foliage or bulb injury, defoliation experiments were carried out with two varieties in order to determine the effect of foliage loss on yield. It was found that the critical period for loss of foliage, resulting in a nearly 100% damage, is the week before bulbing begins. Complete removal of the foliage caused higher losses than removal of half the foliage. When a hail storm occurs only one or two weeks before the harvest, both bulbs and foliage are likely to be injured. In this case losses are very great.

1521. Chroboczek, E. 635.25: 632.77
Skierniewickie doswiadczenia ze zwalczaniem śmietki cebulowej. **(Experiments at Skierniewice on the control of the onion fly.)**
Przeglad Ogrodniczy, Vol. **24**, Nr. 6, May, 1947.

In 1945 and 1946 the author conducted tests of different methods of control for onion fly, *Hylemyia antiqua* Meig. Methods recommended against cabbage fly, such as 1% solution of "Forbiat", 0·06% of Kortofin, 0·3% of tar oil emulsion, proved ineffective. In another series of trials several substances having a strong odour, e.g. lysol, kerosene, tar oil, powdered lime, were used as repellants. The best results were obtained by application of kerosene-treated soil. 15 kg. of kerosene was added to 1 cubic metre of soil taken directly from the field. This treated soil was applied twice by hand to the onion rows, first when the seedlings were 3-5 cm. high, 20 days after sowing, and again 15 days later. The amount of soil used each time was 80 litres to 100 m², with rows 30 cm. apart. The number of plants on the check plots at harvest time was 962·2±128·4 and on the kerosene-treated plots 1,745·2±77·7, the respective yields of onions being 81·4±6·2 kg. and 124·9±3·6 kg. The difference in number of plants was therefore 81·4% and in yield 53·4%. On the hectare basis the yield of check onions amounted to 271·3 quintals, that of the kerosene-treated to 416·3 quintals. Experiments on this problem are being continued. E.C.

1522. Maan, W. J. 635.25: 632.77
Zaadbehandeling met D.D.T. tegen de uienvlieg. **(The use of DDT for treating seeds to control the onion maggot.)** [English summary 6 lines.]
Meded. Direct. Tuinb., 1947, **10**: 19-21.

Field trials in Holland during 1946 showed DDT to be effective as a seed-dressing against the onion maggot, *Chortophila antiqua* (Meig.), the results being as good as, or even better than, those obtained with calomel. The seed was coated with a sticker (Dextrol RR) and then stirred into the insecticide. 20 g. DDT were used for 100 g. of onion seed and applied in the form of 40 g. DDT talc powder containing 50% DDT.

1523. McLeod, W. S. 635.25: 632.77
Hexachlorocyclohexane in the control of onion maggot.
J. econ. Ent., 1946, **39**: 631-7, bibl. 8.

Hexachlorocyclohexane, applied either as a spray containing 0·02% or a dust containing 0·5% of the gamma isomer gave

excellent control of the onion maggot, *Hylemyia antiqua*; but seed, moistened with 25% sugar and mixed with 20% hexachlorocyclohexane in gypsum, produced seedlings that died. Pure DDT, applied to seed or soil, gave good control, as did calomel; but the latter was costly and retarded the growth of the onions.—Winnipeg.

1524. McLeod, W. S. 635.25: 631.531.17
Effect of hexachlorocyclohexane on onion seedlings.
J. econ. Ent., 1946, **39**: 815, bibl. 1.

The effect was not noticeable with less than 0·5 g. per 2 lb. soil; at 1 g. and 2 g. shoots were shorter and thicker than normal; and above 4 g. the seedlings failed to break the surface. The chemical must be applied to the soil with caution.

1525. Haber, E. S., and Snedecor, G. W. 635.31: 631.55
Forecasts from an incomplete experiment on asparagus.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 481-7.

Estimations are envisaged which may help the planning of the asparagus canning season to fit maximum production.

1526. Currence, T. M. 635.31
Progeny tests of asparagus plants.
J. agric. Res., 1947, **74**: 65-76, bibl. 10.

Of strains of asparagus from open-pollinated seeds the better phenotypes tended to produce better progenies than the poorer ones. The desirability of making progeny tests was shown by the best two lines producing a 50% greater crop than the mean of all lines. Distinct differences were noted between parents for transmitting yield genes and between single crosses for favourable combinations. Total progenies from one male parent differed significantly from the theoretical sex ratio. All significant deviations were the result of excess males with the disproportionate ratios approaching 1 female : 2 males.

1527. Shafer, J., Jr. 635.31: 632.954
Pre-emergence sprays for weeding asparagus seedlings.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 406, bibl. 1.

A dry cleaning oil and a di-nitro compound show promise.—Geneva, N. York.

1528. Brieger, F. G., and de Moura Campos, F. A. 635.34
Estudo sôbre as brássicas chinesas. **(A study of Chinese cabbages.)**
Reprinted from *O Hospital*, 1944, **26**: 685-707.

It is suggested that the Chinese cabbage, *Brassica juncea*, is more suitable than the forms of *B. oleracea* for cultivation in subtropical and possibly tropical regions. In Brazil, at least, its cultivation does not appear to be difficult. The nutritive value of the Chinese cabbage is high for proteins, calcium salts, iron and phosphorus. The authors' results show that it is superior to the ordinary cabbage of North America. Sometimes the ascorbic acid content was low but this may have been because the vegetables analysed were taken in the evening.

1529. Sun, V. G. 581.162.1: 586.832
A study of the size of pollen grains in the genus *Brassica*.
Abstr. J. agric. Ass. China, 1943, No. 175, p. III [received 1947].

The genus *Brassica* may be divided into a large-pollen group, formed by species with n=18 and n=19 chromosomes, and into a small-pollen group, composed of n=9 and n=10 species. Measurements are given. In general morphological appearance a close relationship exists between the n=9 and n=19 species on the one hand and between the n=10 and n=18 species on the other.

1530. Sun, V. G. 586.832: 631.523
Hybrid vigour in *Brassica*.
Abstr. J. agric. Ass. China, 1943, No. 175, p. IV [received 1947].

(1) Interspecific *Brassica* crosses within the same chromosome group were easily obtained by the bud pollination method. Crosses between species with different chromosome numbers were successful only if the female parent belonged to the higher chromosome group. Tayutsae is considered to be a variety of *B. juncea* and Siaoyutsai a variety of *B. chinensis*. Hybrid vigour may be of practical value in the F_1 of Siaoyutsai, if the parents are genetically as different as possible.

1531. Banga, O. 635.34: 631.523+631.531
Sluitkoolproblemen in Amerika (Teelt, veredeling en zaadteelt). **(Cabbage problems in America (culture, breeding and seed-growing).)**
[English summary 14 lines.]
Meded. Inst. Vered. TuinbGewass, Wageningen, **3**, 1946, pp. 43, bibl. 39.

The author gives an account of the cultivation of the cabbage in different parts of the U.S., and of the varieties grown; he describes methods used in breeding and multiplication of seed.

1532. Walker, J. C. 632.1/4: 635.34/36
Diseases of cabbage and related plants.
Fmrs' Bull. U.S. Dep. Agric. **1439**, slightly revised 1944, pp. 38.

All the more important diseases and troubles of the cabbage-type plants are dealt with, including storage diseases. Black leg (*Phoma lingam*) and black rot (*Bacterium campestre*) are more or less prevalent in the central, eastern and southern United States. Hot-water seed treatment is recommended, except when the seed comes from the Pugent Sound, Wash., area, the principal seat of the American cabbage seed industry. Considerable space (7 pp.) is devoted to cabbage yellows (*Fusarium conglutinans*), a disease which causes great losses from Long Island to Colorado. Resistant varieties are named, described and illustrated.

1533. Green, D. E. 635.34/36: 632.4
Black spot disease on brassica seed crops.
Gdnrs' Chron., 1947, **122**: 178-80, bibl. 3.

Alternaria oleracea can be controlled in the U.K. by spraying the flower stalks with bordeaux mixture or colloidal copper with a spreader.—R.H.S. Laboratory, Wisley.

1534. Günthart, E. 632.951: 635.3
Über die insektizide Wirkung eines Benzolhexachlorid-Präparates. **(The insecticidal properties of a benzenehexachloride preparation.)**
Reprint *Mitt. schweiz. ent. Ges.*, 1945, **19**: 648-9.

Experiments with the benzenehexachloride preparation Maag showed that it has good contact and penetrating properties and that it can be recommended as a simple and safe control measure against turnip gall weevil (*Ceuthorhynchus pleurostigma*) and cabbage stem weevil (*C. quadridens*).

1535. Borg, Å. 632.78
Ett bekämpningsförsök mot kålmalen. **(Experimental control of the diamond back moth.)**
Växtskyddsnotiser, 1946, No. 5, pp. 65-8.

In Sweden, the diamond back moth appeared in exceptionally high numbers in the summer of 1946, but by the end of July the infestation was controlled by hymenopterous parasites, belonging largely to the species *Angitia fenestralis*. Of 86 chrysalises collected between 2 and 14 August all were found to be parasitized and not one hatched. In a comparative test of insecticides Rotoxol 66, a combined DDT-Gammexane preparation, ranked first with a practically 100% kill of larvae on cabbage plants.

1536. AHLBERG, O. 632.78
Gammaflyet 1946. (The gamma moth in 1946 [in Sweden].)
Växtskyddsnotiser, 1946, No. 6, pp. 81-5.
In 1946, gamma moth (*Plusia gamma*) infestations were unusually heavy in all parts of Sweden, and the pest proved a nuisance even in gardens, both to vegetables and flowers. Trials, details of which are not reported, showed that DDT was more effective than arsenic, but that a DDT preparation containing Gammexane gave the highest kills of larvae, viz. about 90%.

1537. THOMPSON, R. C. 635.35
Cauliflower and broccoli varieties and culture.
Fmrs' Bull. U.S. Dep. Agric. **1957**, 1944, pp. 17.
Cultural, climatic, soil and fertilizer requirements of the two crops are discussed, and the need for seed of a good strain is emphasized. During the war the United States has made herself independent of Danish and Dutch cauliflower and broccoli seed and is even exporting this type of vegetable seed now. Pests and diseases are also dealt with.

1538. BANGA, O. 635.35
Bloemkoolstudies I. Vergelijking van bloemkoolrassen in een vrijsterteelt in een koud warenhuis op zandgrond. II. Vergelijking van eenige "Herkomsten" van vroege bloemkoolrassen in een weeuwenteelt in een koud warenhuis op zandgrond. **(Cauliflower studies. Comparison of early sown varieties, and of late sown, early maturing varieties from various sources, all grown in an unheated greenhouse in sandy soil.)**
Meded. Tuinb. VoorlichtDienst **30**, 1942, 61 pp. [received 1947].
Statistical studies of the behaviour and cropping of cauliflower varieties grown in Holland. Of the early sown (20 January) varieties Alpha proved the best; it cropped early and had firmer heads of better quality than other varieties tested. Of the late sown (19 September) varieties there was a relation between earliness and cropping in selections from various sources, the earlier a variety or selection the smaller the crop, the later it is the greater the crop. In the variety Veentje the selections from various sources differed in type, earliness, size of crop and quality.

1539. NILSSON, F. 635.35: 631.521
Fröodlingsförsök med blomkål 1942-1944. **(Seed growing experiments with cauliflower in Sweden, 1942-1944.)** [English summary 1 p.]
Reprinted from *Arsskr. Alnarps Lantbruks-, Mejeri-Trädgårdsinst.*, 1946, pp. 159-205, bibl. 4, being *Meddel. Trädgårdsförs.* **35.**
Experiments at Alnarp showed that conditions in Sweden are suitable for growing seed crops of cauliflower. At close spacing (40×40 cm.) yields averaged 540 kg. per hectare, the average germination being 87%. Sowing in autumn and planting out early in spring has proved most advantageous.

1540. JANES, B. E. 635.1/7: 581.05: 577.16
Variations in the dry weight, ascorbic acid and carotene content of collards, broccoli and carrots as influenced by geographical location and fertilizer level.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 407-12, bibl. 12.
In tests at 8 places and with 3 fertilizer levels in Florida, dry weight, ascorbic acid and carotene content varied considerably with season and location but not with fertilizer level. High ascorbic acid was correlated with high dry weight.

1541. WILDMAN, S., AND BONNER, J. 635.41: 581.192
Separation and properties of the auxin protein of spinach leaves.
Abstr. *Amer. J. Bot.*, 1946, **33**: 839.
Methods have been devised for the large-scale extraction of the protoplasmic contents of the cells of spinach leaves.

1542. WILDMAN, S. G., FERRI, M. G., AND BONNER, J. 635.41: 581.192
The enzymatic conversion of tryptophan to auxin by spinach leaves.
Abstr. *Amer. J. Bot.*, 1946, **33**: 839.
Spinach leaves can rapidly convert tryptophane to a plant growth substance. In 3·5 hours ten times more auxin was extracted from leaves infiltrated with tryptophane and neutral buffer than with buffer alone. The reaction occurred also in lyophilized protein preparations, the enzyme system being confined to the cytoplasm of the leaf cells. The reaction requires oxygen.

1543. ISELY, D., AND MINER, F. D. 635.41: 632.753
Control of aphids on spinach with hexachlorocyclohexane.
J. econ. Ent., 1946, **39**: 550, bibl. 1.
0·75% Gammexane in pyrophyllite dusted on spinach in Arkansas, at about 70 lb./a., very greatly reduced infestation by the green peach aphid, *Myzus persicae*.

1544. MYERS, A. T. 635.48: 581.192
Seasonal changes in total and soluble oxalates in leaf blades and petioles of rhubarb.
J. agric. Res., 1947, **74**: 33-47, bibl. 17.
From the data obtained it appears that rhubarb with leaves from 10 to 35 days old is best for eating and for soluble oxalate content. There was not much increase in soluble oxalate in the petioles of leaves 46 to 60 days old over that of those 35 days old. The continuous increase in acids in the leaf blades during the season of most active photosynthesis suggests that they arise either as a direct result of photosynthesis or indirectly from carbohydrates.

1545. BJORNSETH, E. H. 635.48: 631.544
The effect of bottom heat on the yield of forced rhubarb.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 363-8, bibl. 3.
A great increase in early yield and an increase in total yield was obtained by the use of bottom heat maintained at 13° C. The grading of the rhubarb following treatment was not quite so good as for untreated rhubarb. Results with treatment at other temperatures are also given.

1546. BJORNSETH, E. H. 635.48: 631.544
The effect on yield of freezing and various ethylene treatments in breaking the dormancy of rhubarb.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 369-73, bibl. 4.
Rhubarb treated with 2 parts ethylene to 1,000 parts of air for 12-24 hours was 10 days earlier than that receiving no treatment, but no earlier than that frozen in the field and forced on 7 December. The treatments given at East Lansing and the results are described and discussed.

1547. ANON. 635.52
Great Lakes lettuce. A useful imported variety.
Agric. Gaz. N.S.W., 1947, **58**: 61.
Trials in New South Wales with the Great Lakes lettuce, a variety imported from U.S.A., are briefly described, the results being generally favourable. The variety produces a large percentage of marketable heads of first-class quality and flavour; it is medium to large in size and very compact. Leaves have serrated edges giving a frilled appearance. The outer leaves are dark green and glossy, the heart leaves white. The texture is crisp and brittle. It is not prone to bolting and has shown resistance to slime and tip-burn, but is susceptible to spotted wilt.

1548. WOODMAN, R. M., AND JOHNSON, D. A. 635.52
The effect of time of sowing and water supply on the bolting and growth of lettuce.
J. agric. Sci., 1947, **37**: 95-112, bibl. 15.
A statistical experiment in an unheated greenhouse was made on May King lettuce grown in a gravel soil from the Cambridge Horticultural Research Station, to ascertain the effect

of periodic sowings, two levels of water and alternate drought and saturation with water on bolting and growth. Mature lettuces at a low level of water were darker than those at a high level. The largest lettuces were harvested in October to May (excluding mid-January to late March), a period of low temperatures less than 60° F., short days, and increasing ages from germination to harvest. For lettuces sown in April to early June which bolted without hearting, the yield was poor, whereas for those sown in August to November, which hearted before bolting, the yield was good, being encouraged by a high level of water. A high level of water also tended to delay bolting and encourage hearting of lettuces sown in January to March. In general, water had no effect on age at bolting but a high level tended to greater yield. Lettuces sown in September to November had the longest life to bolting, the greatest fresh weights of heads, and hearted before bolting, this being the best period for sowing. August to March or April sowings resulted in high dry matter in the tops, high fresh yields of roots and whole plants, and high dry matter in roots and whole plants, a high level of water being favourable for all five of these yields. Sowings from early May to early July tended to greater top formation relative to root formation as compared with August to April sowings; a high water level or alternate drought and saturation both encouraged increased top/root ratios for these sowings, but had no effect on the relative development of top to root for August to April sowings. The effect of level of water and alternate drought and saturation was similar with the top/root ratios for dry matter. Lettuces (tops) sown in April to early July contained the greatest percentages of moisture, and a high level of water tended to increase the percentage. The moisture in the whole plants for April to early July sowings was also increased by a high level of water or by alternate drought and saturation, but not that for sowings made in August to March. [From authors' summary.]

1549. Jones, L. T., and Eckersley, J. P. 635.52: 631.8
Fertilisers for lettuces at York.
J. Agric. W. Aust., 1946, **23**: 294-307.

The experiment described was carried out on lettuces on a red-brown soil in the hope of showing the satisfactory replacement of blood and bone manure with mineral fertilizers. The results and recommendations are summarized as follows: (1) The primary fertilizer need for lettuces under the conditions of the experiment was nitrogen. (2) When the source of nitrogen was blood and bone only, at least a ton per acre had to be used for satisfactory yields. (3) All six mineral fertilizer treatments were as good or even better than one ton of blood and bone manure per acre. (4) Potash had no beneficial effect. (5) With the autumn-planted lettuce the artificial fertilizers could be applied once, about one week after transplanting. (6) Two cwt. per acre of superphosphate plus 3 cwt. per acre of sulphate of ammonia gave as good or even better results than one ton of blood and bone per acre. (7) There was no evidence of fertilizer injury even when mineral fertilizers were used at the rate of 15 cwt. per acre. (8) Low rates only of mineral fertilizers were needed when chiefly nitrogenous fertilizers were used. (9) Blood and bone proved to be a relatively inefficient nitrogenous fertilizer when compared with sulphate of ammonia; an application of only 3 cwt. per acre of sulphate of ammonia gave results equal to or even better than one ton of blood and bone manure.

1550. Meereboer, P. J. 635.55: 612.014.44
De invloed van de temperatuur en de daglengte op het doorschieten van zomerandijvie. **(The influence of temperature and daylength on bolting in summer endive.)**
Tuinbouw, 1947, **2**: 84-8.

Endive plants in the early stages of growth were subjected to different temperatures and day lengths (modified when necessary by artificial lighting and by shading) and various periods of vernalization. Day length apparently had little effect and vernalization was not favourable. It is concluded that, to get the best crops of endive before or during June, the seed should be sown in warm frames and after potting out the plants should be kept at a temperature above 10° C.

1551. Howard, H. W. 635.561
Wild and cultivated watercress types.
Agriculture, 1947, **53**: 453.

The author notes that 2 new types of watercress might be useful for commercial growing. The first is an autotetraploid green (summer) cress obtained by colchicine treatment from the normal green cress. The other, which might prove better than the present brown (winter) cresses, is a hybrid between autotetraploid green cress and *Nasturtium uniseriatum*.

1552. Whitaker, T. W., and Pryor, D. E. 635.62: 581.162.3: 577.17
Effect of plant-growth regulators on the set of fruit from hand-pollinated flowers in *Cucumis melo* L.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 417-22, bibl. 7.

Four years' records at two very differently situated centres in California showed that about one-third of artificially pollinated flowers of *Cucumis melo* set fruit. The application of 6 well-known growth substances and of 2 pollens had no effect, but an increase of about 22% in set was achieved by the use of 4-chlorophenoxyacetic at time of pollination.

1553. Goldgauzen, M. 635.61: 631.523
Breeding high quality early melons by hybridization methods. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1945, No. 11-12, pp. 25-8.

The work of producing quickly ripening melons of good quality by hybridization involved raising seedlings on a large scale, F_2 sowings giving 1,000 to 2,000 plants and F_3 families each consisting of 500 individuals. As the forms are not homozygous the difficulty of obtaining fixed forms is evident. It is recommended that the F_2 forms be back-crossed in order to obtain homozygotes more quickly; this is best done with early ripening parents or some form with morphological characters near to those of the quick-ripening form. It is advised that crossings should not be carried out without a preliminary study of the characters associated with quick ripening. The breeding-work had yielded one constant variety—Guljsor—released in 1942 for tests in variety trials in certain districts including the mountainous Pamir regions. This variety not only ripens quickly but is large-fruited with dense, sweet and tender flesh; in yield and quality it is superior to the earliest varieties.

1554. McLean, D. M. 635.611: 581.46
Stamen morphology in flowers of the muskmelon.
J. agric. Res., 1947, **74**: 49-54, bibl. 11.

The morphological interpretations of the dissimilar stamens of the androecium of certain cucurbitaceous plants is reviewed. The author investigated the vascular structure of the staminate and perfect flowers of the muskmelon (*Cucumis melo*) with particular reference to the vascular supply of the stamens, and concludes that it seems probable that muskmelon flowers and perhaps those of all the *Cucurbitaceae* were originally pentamerous throughout.

1555. Sinnott, E. W. 635.62: 581.145
Relative growth of pedicel and fruit in *Cucurbita*.
Abstr. *Amer. J. Bot.*, 1946, **33**: 826.

In the types studied the pedicel attains its full growth considerably before the fruit. The early part of pedicel growth is exponential but always at a rate less than that of

the fruit. When the diameter of the fruit (corrected to spherical form) reaches about 10 times the pedicel diameter, fruit growth ceases. The limiting ratio of fruit to pedicel is attained much earlier in small-fruited races than in large ones.—Yale University.

1556. MORGAN, C. N. 635.63(94.3)
Cucumber growing.
Qd Agric. J., 1947, **64**: 217-8.
Hints on the planting, care and harvesting of cucumbers in Queensland, with a list of four recommended varieties.

1557. VAN KOOT, Y. 632.48: 635.63 + 635.61
De Fusariumziekte van komkommer en meloen. **(The *Fusarium* disease of cucumber and melon.)**
Meded. Tuinb. Voorlicht Dienst **42**, 1946, 85 pp.
The symptoms of the *Fusarium* disease of cucumber are (1) brown colouration and decay of the foot (foot-rot), and (2) withering of the leaves. The disease is caused by 7 species and varieties of *Fusarium*. It is favoured by low temperatures (below 20° C.) and lack of sufficient light, and to a great measure by heavy dressings of stable manure and ammonium compounds. The cucumber, melon and bean are the most important hosts. Various types of cucumber show little difference in susceptibility, but certain species of melon and beans are less susceptible than others to certain *Fusarium* species. Repeated cultivation of crops susceptible to the cucumber *Fusaria* may lead to serious infestation of the soil. Disinfection of the soil, woodwork and tools is recommended. Diseased plant remains should be burned. The use of infested straw manure from cucumber houses should be avoided and infection of the irrigation water should be prevented.

1558. HEUBERGER, J. W. 635.63: 632.4
Control of downy mildew disease on cucumbers and cantaloupes.
60th Trans. Peninsula hort. Soc., 1946, in *Bull. Delaware St. Bd Agric.* **36**: 5: 73-9.
Dithane Z-78 (zinc ethylene bisdithiocarbamate) and Zerlate (zinc dimethyl dithiocarbamate) gave excellent control of downy mildew, *Pseudoperonospora cubensis*, on cucumbers and cantaloupes, which cropped better than those treated with the normal copper fungicides. Fermate (ferric dimethyl dithiocarbamate) gave good results on cucumbers but was not used on cantaloupes.

1559. HERVEY, G. E. R., AND SHROEDER, W. T. 635.63: 632.76
The varietal response of cucumbers to DDT control.
J. econ. Ent., 1946, **39**: 403-5, bibl. 2, being *J. Pap. N. York agric. Exp. Stat. Geneva* **665.**
DDT dust controls the striped cucumber beetle and bacterial wilt better than does calcium arsenate and copper. But it stunts the growth of Ohio 31; further research on varietal reaction is necessary.

1560. ALGÉRIE [PERONNE, P.]. 635.64(65)
Culture de la tomate en Algérie. **(Tomato growing in Algeria.)**
Doc. Rens. agric. Algér. Bull. **41,** 1945, pp. 18.
The growing of outdoor tomatoes for consumption in spring, summer, autumn and winter is described separately, and varieties for each season are recommended.

1561. KRAJEVOĬ, S. I. 631.523: 635.64
On the possible causes of hybrid vigour in plants.
*C.R. Acad. Sci. U.R.S.S., A*1946, **54**: 817-20.
In the experiments described two varieties of tomato were used; one of them, Goldene, has yellow fruits; the other (*Solanum lycopersicum* var. *pimpinellifolium*) produces racemes of small red fruits. These two varieties were grafted and crossed with each other in both directions. From the data obtained the author concludes that: When the varieties are crossed, heterosis is observed and expressed in increased dimensions of the various organs of the plant as well as in increased size of the whole plant. As a result of grafts made between the same plants, no increase in size of the individual organs was observed in the seed progeny, nor in the size of the whole plant, as compared with the components of the graft. The interaction between the stock and scion evidently does not produce, in the seeds formed by the scion, such alterations as would cause the phenomenon of heterosis.

1562. GOODALL, D. W. 635.64: 581.11
The distribution of weight change in the young tomato plant. II. Changes in dry weight of separated organs, and translocation rates.*
Ann. Bot. Lond., 1946, **10**: 305-38, bibl. 66.
Assimilation, respiration, and translocation were studied in the tomato plant, at a stage when it had developed 8 leaves, by following during the 24 hours the dry-weight changes both in the intact plant and in the separated organs. Turgid, separated leaves if fully exposed to light may assimilate more than similar leaves attached to the plant. When separated leaves were supported in such a manner that they were subjected to the same conditions of mutual shading as on the plant, they assimilated less than attached leaves, even though they showed no signs of wilting. Wilted leaves assimilated much less than turgid leaves. Root respiration in the evening was more active in summer than in winter, in spite of the similarity of the mean temperatures. Detached leaves lost dry weight more rapidly from dusk to midnight than from midnight to dawn. In the detached leaves, assimilation before midday was more rapid in summer than in winter; but for the afternoon the winter figure was higher. The respiration rate was highest and the assimilation rate lowest in the very young leaves. The assimilation rate in successive leaves increased from the youngest down to the leaf which had reached about half its final length and then remained fairly constant. In all parts of the plant, translocation was more rapid by day than by night; on average it was about twice as rapid. At all times translocation was proceeding from the cotyledons and the first 4 leaves to the stem, root, and the 4 younger leaves. The fifth leaf, with a length of 7 cm., obtained by translocation about one-third of its increment in dry weight over the 24 hours. Translocation during the day was more rapid in summer than in winter, but the greater amount of translocation in summer, as in the case of assimilation, is to be ascribed rather to the longer day than to an increased rate. About half the material translocated to the root during the 24 hours was lost in respiration. In the case of the stem, on the other hand, assimilation and respiration approximately balanced, and its increase in dry weight corresponded to the amount translocated to it.
In winter, one-third of the material translocated from the older leaves passed to the root, one-third to the stem, and one-third to the young leaves. In summer, the proportions were respectively half, three-eighths, and one-eighth. Evidence is adduced that the rate of translocation is affected by the amount of "surplus assimilate" present in the leaf. It is probable that light intensity and temperature are also concerned, though this is not established. These three factors, together perhaps with the assimilation rate at the time, account satisfactorily for all the variation in translocation rate with time of day, but not for all the variation between translocation rates found at different seasons. There is no evidence that the amount of "surplus assimilate" present affects the assimilation rate. [Author's summary.]—Imperial College of Science and Technology, London, and Experimental and Research Station, Cheshunt.

1563. ROSS, A. A. 635.64: 581.14
Studies of growth correlations in the tomato.
Qd J. agric. Sci., 1946, **3**: 121-56, bibl. 25.
An investigation of the correlations in Salads Special tomato between dimensions of plant parts and dry weight of plant, area of individual leaves and fresh weight of fruit.

* For summary of first paper of this series, see *H.A.*, 15: 1166.

1564. Beljdenkova, A. F. 635.64: 581.035
The possibilities of accelerating growth and increasing the yield of tomatoes in the North. [Russian.]
A symposium on scientific work carried out at Leningrad 1941-43, 1946, pp. 367-71, bibl. 4. Komarov bot. Inst. Acad. Sci. U.S.S.R., Leningrad.

In 1942-43 the author studied the influence of light regimen on the development and yield of tomatoes on the one hand, and the correlation between the number of stems and yield on the other. Three varieties of tomato were grown under 10-hour day conditions for 15, 20, and 25 days in the open at a temperature varying from 20 to 25° C. during the day and from 12 to 15° C. at night. The experimental plants yielded 16-128% more fruit than controls grown under normal day light. Repeated experiments in 1943 with 5 varieties gave similar results, although one variety, Dwarf Stone, produced, under an artificially shortened day, less fruit than the controls. The influence exerted by the removal of lateral shoots was studied in 3 varieties also in 1942-43. The plants were divided into 4 groups in which 1, 2 or 3 stems only were allowed to develop; no lateral shoots were removed from the controls. Although the yield of fruit and its ripeness varied a great deal both in experimental plants and the controls, ripening was more rapid in plants with one stem, while the greatest yield of fruit per plant was obtained from those with 2 or 3 stems according to the variety and prevailing temperature during the summer.

1565. Clarke, E. 635.64: 631.83
Studies on tomato nutrition. II. The effect of varying concentrations of potassium on the growth and yields of tomato plants.
J. Dep. Agric. Éire, 1946, **43**: 52-67, bibl. 13.

Among conclusions reached in these trials carried out in 1943 are the following: An adequate basal supply of available potash is essential if maximum benefit is to be obtained from top dressing tomato plants. In a soil low in potash the best basal dressing appears to be 1 oz. per plant or 1,000 lb. per acre of potassium sulphate. Given adequate basal amounts present, whether naturally or by reason of application, optimum results are derived from 2 light top dressings at the rate of $\frac{1}{8}$ oz. per plant. More frequent use of this dressing leads to depressed yield, smaller fruit and slower ripening. The potassium-magnesium ratio in the growth medium should be controlled, remembering that the wider it is the greater is the likelihood of chlorosis occurring, and the relationship should be noted between high potassium manuring, magnesium deficiency and "green back" of tomato fruits. There are indications that the iron requirements of Potentate may be greater than those of certain other commercial varieties. The relation between this and green-back in the fruit is being further studied.

1566. Hester, J. B. 635.64: 631.8
The plantfood aspects of tomato production.
Canad. Fd Packer, 1946, **17**: 4: 23-7, 31, 33.

The nutritional requirements per acre for the production of a 10-ton crop of tomatoes are estimated to be 93 lb. calcium, 15 lb. magnesium, 107 lb. nitrogen, 7 lb. sulphur, 34 lb. phosphoric acid, 198 lb. potash, 0·47 lb. iron, 0·65 lb. manganese, 0·06 lb. boron, 0·08 lb. copper, and 0·12 lb. zinc. These elements must be either present in the soil or added by manure or commercial fertilizer. The chemical analyses of certain Canadian soils and one in New Jersey are tabulated. All the Canadian soils out-yielded the New Jersey soil; the ascorbic acid and sugars were also higher. Without an analysis of the soil a general recommendation for tomatoes is: (1) Plough down about 10 tons of manure. (2) Use a good grade of plants and set as early as possible. (3) Use 5 lb. of a highly soluble plant starter in each 40 gal. of water; the plant starter should analyse about 8-24-8 (N-P_2O_3-K_2O). (4) Use 1,000 lb. of a commercial fertilizer analysing about 3-12-15 or 2-12-10. Broadcast and disk this into the soil, plough down or use as a side-dresser. Never use more than 500 lb. in the row before planting. (5) As a special precaution see that each ton of fertilizer carries 10 lb. of borax and 100 lb. of manganese sulphate. Using borax in the fertilizer has produced 1 to 2 tons increase in yield, and manganese has given a slight increase.

1567. McCollum, J. P. 635.64: 581.192
Effect of sunlight exposure on the quality constituents of tomato fruits.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 413-6, bibl. 5.

Tests at Urbana, Ill., showed that unshaded tomatoes were higher in ascorbic acid total solids and sugars than shaded ones. Exposed fruits, although high in quality constituents, may be low in total carotenoids, especially when high temperatures prevail.

1568. Howlett, F. S., and Marth, P. 635.64: 577.17
Aerosol applications of growth regulating substances to the greenhouse tomato.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 458-74, bibl. 3.

In tests in two greenhouses near Cleveland, Ohio, spraying the first 3 clusters of tomato plants with aerosols, solutions and emulsions of named growth substances resulted in much earlier fruit production and in increases in yield of 20 to 40 oz. per plant. The most satisfactory aerosol treatment contained β-naphthoxyacetic acid, indolebutyric acid and 4-chlorophenoxyacetic acid. Used alone β-naphthoxyacetic acid was best. Environmental conditions affected all results, which are here discussed in detail.

1569. Wilson, K. S., and Withner, C. L., Jr. 635.64: 631.541.11/12
Stock-scion relationships in tomatoes.
Amer. J. Bot., 1946, **33**: 796-801, bibl. 20.

No reciprocal effect between stock and scion in any of the combinations was visible. Varietal differences in vitamin content and distribution were found. Fruits were highest in thiamin and niacin, leaves in riboflavin, and roots contained more niacin than leaves. In general, vitamin concentrations were lower in organs of grafted than in those of ungrafted plants, and there was no evidence that differences between two graft symbionts in vitamin production were transferred from one moiety to the other.

1570. Lowman, M. S., and Kelly, J. W. 635.64: 631.541: 581.192
The presence of mydriatic alkaloids in tomato fruit from scions grown on *Datura stramonium* rootstock.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 249-59, bibl. 12.

By grafting tomato on to stramonium it has been found possible to avoid loss due to nematodes. The process is simple and the plants do well. Analytical tests of the tomato fruits resulting and experiments on dogs indicate that (1) poisonous alkaloids are present in such fruit, (2) the amount varies greatly, (3) the likelihood of serious poisoning is remote when only normal amounts of the fruit are eaten, but the danger must be recognized as present.—Beltsville, Md.

1571. Young, P. A. 635.64: 632.1
Cuticle cracks in tomato fruits.
Phytopathology, 1947, **37**: 143-5, bibl. 6.

Severe cracking of the cuticle of tomato fruits, associated with heavy rainfall, is described. It was seen in commercial varieties of green-wrap tomatoes with unripe fruit that had dark green stem-ends (due to UU-genes). Less cracking occurred in tomatoes that had uniformly coloured whitish-green unripe fruits (due to uu-genes).

1572. WALSH, T., AND CLARKE, E. J. 635.64: 632.19: 546.72
Iron deficiency in tomato plants grown in an acid peat medium.
Reprinted from *Proc. roy. Irish Acad.*, 1945, **50**, Sec. B, pp. 359-72, bibl. 10.

It was accidentally observed that the young foliage of tomato plants growing in an acid peat soil exhibited chlorotic symptoms which were in every way similar to those cured by a ferrous sulphate spray. An investigation into the causes of this unusual chlorosis showed that an increase in the acidity of the medium, produced by addition of sulphur, was accompanied by an increase in the concentration of water-soluble zinc. It is suggested that the relatively high zinc concentration had a toxic effect on the roots, interfering with the transport of iron to the leaves. It was further found that over the range pH 3·2-7·4 the solubility of iron is depressed in the presence of a high concentration of phosphorus. This effect alone, however, is not of sufficient magnitude to cause chlorosis.—University College, Dublin.

1573. REED, H. S. 635.64: 632.19: 546.47
Effects of zinc deficiency on phosphate metabolism of the tomato plant.
Amer. J. Bot., 1946, **33**: 778-84, bibl. 12.

Stems and leaves of tomato plants affected by zinc deficiency were dwarfed, pale green and more or less necrotic; affected stems contained relatively more inorganic phosphate and phenol oxidase than those of healthy plants, and were richer in phosphatase and poorer in hydrogenase. The leaves of affected plants contained more reducing sugars, but slightly less sucrose and starch than those of healthy plants.

1574. MOORE, W. C. 635.64: 632.3
Bacterial canker of tomato in England [*Corynebacterium michiganense*].
Agriculture, 1947, **54**: 138-42.

A disease which, though not serious as yet in this country, needs watching. [See H.A., 14: 785.]

1575. FOSTER, R. E., AND WALKER, J. C. 635.64: 632.48
Predisposition of tomato to fusarium wilt.
J. agric. Res., 1947, **74**: 165-84, bibl. 26.

The action of external factors on disease development was studied by subjecting healthy young tomato plants to variations in the environment only before inoculation and then maintaining a constant and optimum set of conditions for wilt development (*Fusarium oxysporum* f. *lycopersici*) after inoculation. The plants were predisposed to wilt by (1) soil or air temperature near the optimum for plant growth, (2) low soil moisture, (3) short day length, (4) low light intensity, (5) nutrient low in nitrogen, low in phosphorus, or high in potassium, and (6) nutrient low in pH. Resistance was increased by soil or air temperatures above or below the optimum for plant growth, by very wet soil, by long daylight periods, and by high light intensity. Plants were less susceptible when grown in solutions high in phosphorus, low in potassium, or high in nitrogen, and also in solutions showing high pH.

1576. MACCREARY, D., AND DETJEN, L. R. 635.64: 632.754
A southern insect of interest to Delaware tomato growers.
60th Trans. Peninsula hort. Soc., 1946, in *Bull. Delaware St. Bd Agric.* **36**: 5: 94.

Crypopeltis varians, a small green plant bug. A 5% DDT dust provided adequate control.

1577. STAHL, C. F. 635.64: 632.78
Reaction of hornworms to certain organic compounds.
J. econ. Ent., 1946, **39**: 610-2, bibl. 1.

On tobacco in cages, DDT, p-aminoazobenzene and its hydrochloride are effective against larvae of the tomato hornworm, *Protoparce quinquemaculata*.—Oxford, N.C.

1578. BOYD, D. A. 631.8: 635.65+635.656
The manuring of beans and peas.
Emp. J. exp. Agric., 1946, **14**: 195-207, bibl. 11.

The results are summarized of all available experiments on the fertilizer requirements of beans and peas carried out in Great Britain. They show that beans need potash. Farmyard manure generally increased the yield, and when dung is used no fertilizers are likely to be remunerative except in cases of extreme deficiency. Beans proved to be moderately responsive to phosphate but the use of nitrogen has little justification. Peas appear to be able to make use of phosphate and potash in relatively unavailable forms; it is doubtful whether the use of nitrogen increases the yield, though it usually improves the appearance of the crop. The current manurial practice for beans and peas on farms is reviewed. Dung was not widely used for beans, but there has been an increase in the use of phosphates. Peas generally received rather less dung and more nitrogen and phosphate than beans.

1579. LEBEDEFF, G. A. 635.65: 631.531
Studies on the inheritance of hard seeds in beans.
J. agric. Res., 1947, **74**: 205-15.

Five selections of beans, which were markedly different, under certain conditions, in their rate of softening of hard seeds, were crossed in various ways. The original selections and their F_1 and F_2 progenies were grown under the same conditions. After laboratory treatment (described) the two soft-shelled selections were unchanged while in three hard-shelled selections seed softening was even more prolonged. Seed softening in various F_1 crosses either approached closely that of the fast-softening parent or was intermediate between that of the two parental selections. In the F_2 seed softening ranged between that found in the two contrasting parental selections, often with almost all possible degrees of variation between these two extremes represented.

1580. BANGA, O. 635.651
Onderzoek naar de cultuurwaarde van eenige nieuwe tuinboonenrassen. **(Investigations concerning the cultural value of some new broad-bean varieties.)** [English summary ½ p.]
Meded. Inst. Vered. TuinbGewass., Wageningen, **2**, 1945, pp. 28, bibl. 4.

Four new broad bean varieties were compared with five standard varieties at Wageningen and Bodegraven in 1942 and 1943.

1581. SMITH, F. L., HOLLAND, A. H., AND MACGILLIVRAY, J. H. 635.653
Forty-five years of continuous cropping with Lima beans.
Science, 1947, **105**: 179-80, bibl. 3.

Evidence indicates that on rather fertile soil, Lima beans do not decrease in yield when continuous cropping is practised.

1582. LO, T. 635.65: 613.2
Nutritional studies on mottled gram bean.
Abstr. J. agric. Ass. China, 1943, No. 175, p. VI [received 1947].

The composition of the mottled gram bean is given, which contains about 20% protein and about 60% carbohydrate. The bean is a good source of vitamin A and of the vitamin B complex.

1583. SCHULTZ, H. K., AND DEAN, L. L. 635.65: 632.8
Inheritance of curly top disease reaction in the bean, *Phaseolus vulgaris*.
J. Amer. Soc. Agron., 1947, **39**: 47-51, bibl. 20.

Curly top resistance is dominant and susceptibility recessive. Data indicate that two factors in dominant and recessive epistasis may explain the mode of inheritance of curly top reaction.

1584. WILSON, R. D. 635.65: 632.3
Rainfall in relation to the production of bean seed free of the bacterial blight diseases.
Agric. Gaz. N.S.W., 1947, **58**: 15-20, bibl. 6.
The author reviews the problem of producing bean seed free of seed-borne diseases, comparing the raising of crops in areas of very low summer-rainfall—as used successfully in the U.S.A.—with the growing of crops in higher rainfall areas under a Seed Certification Scheme, in which thorough inspection of seed-crops is undertaken before and after harvest to ensure disease-free seed.

1585. BOHN, G. W., AND MALOTT, J. C. 635.65: 632.3
The effects of carborundum in inoculating bean plants with bacteria.
Phytopathology, 1947, **37**: 196-8.
The inoculation experiments described suggest that carborundum powder may be useful in inoculations with stoma-invading parasites under conditions that do not favour ingress of the parasite through stomata, but is of little value under conditions that do favour such ingress.

1586. YU, T. F. 635.651: 632.4
***Cercospora* leaf spot of broad bean in China.**
Phytopathology, 1947, **37**: 174-9, bibl. 12.
A serious leaf spot of broad beans in south-eastern China is caused by *Cercospora fabae* Fautr. It is most serious in wet seasons and on low land; in well-drained fields and on uplands it is of little economic importance. The leaf spots are oblong, circular, or irregular, mostly 5 to 7 mm. in diameter, grey centrally, chocolate to red along the margin, and zonate. The diseased tissue may fall out, leaving a shot-hole. The fungus is confined to *Vicia faba* L. and was unable to infect 14 species and one variety of leguminous plants tested. The fungus overwinters on diseased leaves.

1587. YU, T. F. 635.651: 632.8
Spotted wilt of broad bean.
Phytopathology, 1947, **37**: 191-2.
A disease of broad beans in China in 1937 had symptoms characteristic of spotted wilt. The virus, collected from diseased plants, was readily transmitted to young tomato plants in the greenhouse, and from infected tomato plants to broad bean seedlings. The virus was transmitted also to tobacco, pepper and zinnia. It is concluded from these observations and from *in vitro* tests that the virus is that of spotted wilt.

1588. YU, T. F. 635.651: 632.4
***Ascochyta* blight and leaf and pod spot of broad beans in China.**
Phytopathology, 1947, **37**: 207-14, bibl. 12.
The morphology, physiology, cultural characters and methods of overwintering of *Ascochyta pisi* var. *fabae* are described. Inoculations have shown that the fungus is not able to infect peas or a few species of *Vicia*.

1589. VAN DEN BRUEL, W. E. 635.65: 632.76
La bruche du haricot, *Acanthoscelides obtectus* Say, est-elle à craindre pour nos cultures ? **(The bean weevil.)**
Parasitica, 1945, **1**: 84-101, bibl. 25.
An account is given of the distribution of the bean weevil with particular reference to those areas in Belgium where it occurs, its life history and its infestation of beans in the field. Control measures are based on (1) Destruction of the weevil in infested beans by fumigation (e.g. methyl bromide, hydrocyanic acid, etc.). (2) Storing the seed in a place protected from infestation. (3) Preventing the adults from invading the crop, particularly by the destruction of any infested beans before the end of June, and by drying the seeds in places where they are unlikely to become infested.

1590. HELY, P. C. 635.65: 632.77
Control of French bean fly. Experiments with D.D.T.
Agric. Gaz. N.S.W., 1947, **58**: 85-9, bibl. 3.
Experiments conducted in the Gosford district in the autumn of 1946 showed that sprays containing 0·05% DDT are very promising for the control of French bean fly (*Agromyza phaseoli*) when applied at intervals similar to those for the nicotine sulphate-white oil sprays at present recommended; they are easy to mix, safe to apply and their cost is lower.

1591. PAYNE, M. G., AND FULTS, J. L. 635.65: 632.951
Some effects of 2,4-D, DDT, and Colorado 9 on root nodulation in the common bean.
J. Amer. Soc. Agron., 1947, **39**: 52-5.
The results obtained confirm that DDT has a depressing effect on bacterial root nodules of legumes, and show also that 2,4-D has a similar effect but at much lower concentrations. Colorado 9, an insecticide similar to DDT, did not depress bacterial root nodulation of common beans (*Phaseolus vulgaris*) even at relatively high concentrations.

1592. VAN DEN BRUEL, W. E. 635.65: 632.76
Les méthodes de lutte utilisables contre la bruche du haricot, *Acanthoscelides obtectus* Say. **(Control of bean weevil.)**
Parasitica, 1946, **2**: 20-6.
Describes promising results in the control of bean weevil by the use of Gesarol for seed treatment and for dusting or spraying the plants.

1593. POLLARD, L. H., WILCOX, E. B., AND PETERSON, H. B. 635.656: 631.551
Maturity studies with canning peas. The inter-relationship of maturity, tenderometer value, sieve grades, starch and ascorbic acid content of Early Perfection and Perfection peas.
Bull. Utah agric. Exp. Stat. **328**, 1947, pp. 16, bibl. 7.
1. The results indicated an increase in yield as the peas advanced in stage of maturity above a tenderometer value of 85. However, the units increase was greater below a tenderometer value of 102 than it was above this point. 2. The average tenderometer value increase per day was found to be greater as the season advanced. 3. The starch content increased as the peas advanced in maturity. The increase was proportional to the increase in tenderometer value. 4. The percentage of sieve grades varied with maturity. In Early Perfection, grades 1 and 2 decreased rather rapidly with an increase in maturity. The Perfection variety showed less variation in grade 2. In both varieties the percentage of grade 3 showed a marked increase with an advance in maturity. 5. The vitamin C content of fresh peas of either variety gradually decreased with increased maturity. [From authors' summary.]

1594. BANGA, P. [KOPETZ, L. M.] 635.656: 612.014.44
Gevoeligheid voor daglengte van doperwten-rassen. **(Influence of the length of day on varieties of peas.)** [English summary.]
Meded. Direct. Tuinb., 1947, **10**: 81-7, bibl. 5.
The author discusses the experiments of L. M. Kopetz of Vienna* regarding the influence of length of day on different varieties of peas. The data are presented in five tables. Certain early varieties are neutral to day length and can flower in the short days of spring. Other varieties need long days to induce flowering.

1595. ŠČERBAKOV, A. P. 635.656: 631.83
Changes of activity and amount of invertase, amylase and protease in pea sprouts under the influence of potassium. [Russian, English summary.]
Biohimija, 1946, **11**: 281-7, bibl. 16.
The activity of amylase in the stem organs decreased and

* See HA. 14: 809.

that of invertase increased with age, potassium nutrition having no influence on these changes. Enzymic activity was higher in the above-ground organs than in the roots. Potassium deficiency induced increase of the hydrolytic activity of these enzymes during the initial period of sprouting. In the second period of development potassium deficiency produced a rapid inactivation of the enzymes. The activity of proteases increases with age and with potassium deficiency. The activity is higher in the roots and in the cotyledons than in the upper parts of the plants.

1596. Rjahovskiĭ, N. A. 635.656: 632.4
The influence of meteorological factors on the development of ascochytosis in peas (*Ascochyta pisi* Lib.). [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1947, No. 1, pp. 31-3.

From observations made in the Voronesh district of Russia it was found that the development of ascochytosis in peas depends on the rainfall and the air temperature. The latter is a limiting factor only during the earlier phases of growth (May-first half of June). For rapid development of *Ascochyta* rainfall during each 10-day period of not less than 20 mm. is necessary with temperatures of about 20° C. In those years when the 10-day periods with heavy rainfall alternate with 10-day periods of little rain the disease does not become severe.

1597. Anon. 635.656: 632.76
Weevils (*Curculionidae*) attacking growing peas.
Agric. Gaz. N.S.W., 1947, **58**: 157.

An attack on pea plants by two species of weevil, *Prosayleus dispar* and *Desiantha caudata*, is described. The stems of the plants were eaten at, or near, ground level; this caused the plants to wilt and die and many vacant spaces appeared in the rows. No control measure is mentioned. It is suggested that the infestation may have been due to adverse seasonal conditions affecting the natural food supply of the weevils or to their destruction by cultural operations.

1598. Wright, D. W., and Geering, Q. A. 635.656: 632.78
Pea moth [*Laspeyresia nigricana*].
Agriculture, 1947, **54**: 124-9.

After discussing the pest's life history the authors recommend certain cultural and chemical control measures. DDT has proved its value in the second category (½% DDT emulsion at 140 gal. per acre or possibly at lower concentration).

1599. Schwan, B. 635.656: 632.78
Bekämpningsförsök mot ärtvecklaren. **(The control of the pea moth.)**
Växtskyddsnotiser, 1947, No. 1, pp. 15-16.

In Sweden, the pea moth (*Laspeyresia nigricana*), causing a reduction in yield of 150-200 kg. per hectare, has been accepted, more or less, as a necessary evil. Recent experiments at the Plant Protection Station, Stockholm, however, showed that spraying twice or three times with nicotine or DDT reduces the number of pods attacked by more than one-half, viz. from about 20% in the checks to about 9% in the case of nicotine and to less than 8% in the case of a DDT-oil emulsion. The first application was made at the beginning of flowering, the second about a week later. Trials on a field scale are planned for 1947.

1600. Ware, W. M., and Glasscock, H. H. 635.8
Pure culture mushroom spawn.
Agriculture, 1946, **53**: 353-60.
Davies, C.
A mushroom spawn bottle-filling machine.
Agriculture, 1946, **53**: 361-3.

After touching on the history of spawn production processes the authors describe in considerable detail the process of pure culture spawn production used successfully at Wye College. Briefly the process has 4 stages: (1) Composting of horse manure followed by its washing, drying, shredding, bottling and sterilizing; (2) inoculation of this sterilized medium with mushroom mycelium; (3) growth of mycelium under suitable conditions; (4) storing, drying and packing of finished product. A machine devised by the Department of Engineering of the College and worked by hand or by very light, say ⅛ h.p., electric motor for the bottling process is described in the second article.

1601. Pizer, N. H., and Leaver, W. E. 635.8
Experiments with soils used for casing beds of the cultivated mushroom, *Psalliota campestris*.
Ann. appl. Biol., 1947, **34**: 34-44, bibl. 2.

Results of survey showed that the production of mushrooms may be largely determined by the soil used for casing. Casing soils are classified into four grades depending on the numbers of sporophores formed, their rate of growth and the type of mushroom produced. A laboratory method of assessing the cropping potentialities of soils is described.—Wye College.

1602. Lebedeva, L. A. 577.16: 635.8
Vitamin content in edible fungi. [Russian.]
A symposium on scientific work carried out at Leningrad, 1941-43, 1946, pp. 345-47, bibl. 7. Komarov bot. Inst. Acad. Sci., U.S.S.R., Leningrad.

This is a short review of Russian and foreign literature on the subject. Some details are given of vitamin A, B, C, and D content in various species of edible fungi.

1603. Nikolaeva, T. L. 635.8
Mushroom spawn production for commercial use. [Russian.]
A symposium on scientific work carried out at Leningrad, 1941-43, 1946, pp. 349-54, bibl. 10. Komarov bot. Inst. Acad. Sci., U.S.S.R., Leningrad.

Spores and pieces of tissue from the fruit body of *Psalliota arvensis* were sown on various culture media to obtain mycelium for further cultivation. Four out of 23 spore samples, placed in a thermostat at 20-22° C., grew well on the following media: (1) wort+gelatine, (2) oats extract+agar, (3) agar+farmyard manure extract, and (4) water agar+salts and glucose. The most abundant growth, after the first appearance of the mycelium, was on (1) and (2) culture media. Subsequent re-sowing of the pure cultures of mycelium was made on sterile and non-sterile horse dung; the substrate of non-sterile horse dung gave an abundant growth of mycelium at 20-22° C. in 10-15 days. The mycelium thus obtained grew intensively when sown in the open ground and produced, from 150-200 g. of mycelium anything from 2·5 to 7·9 kg. per 1 sq. m. of the sown area. Almost identical results were obtained with the pieces of tissue from the fruit body of mature mushrooms.

1604. Čirkov, V. I. 635.937.34: 577.16
Wild roses of the North and their importance to the vitamin resources of the U.S.S.R. [Russian.]
A symposium of scientific work carried out at Leningrad, 1941-43, 1946, pp. 451-6. Komarov bot. Inst., Acad. Sci., U.S.S.R., Leningrad.

This is an abstract, by the author, of his inaugural dissertation presented in 1943 at Leningrad. An account is given of several trips during which about 1,500 km. were travelled in the Archangel Province, and areas with abundant growth of *Rosa cinnamomea*, as well as *R. acicularis*, were located and examined. At the same time some details are provided of the cultivation of *R. cinnamomea* on a 2 ha. experimental plot; on this the author studied the propagation of *R. cinnamomea*, and the effect of mineral and organic fertilizers on its development and vitamin content in the hips. It is estimated that if collection of hips could be organized in

13 provinces, thousands of tons would be available annually, a quantity sufficiently large to justify the establishment of special factories in the North. Cultivation of *R. cinnamomea* gave satisfactory results; propagation by root cuttings was found to be the simplest and quickest method of reproduction; plots to which K and P fertilizers were applied yielded hips containing 7·17-12·20% of vitamin C in the dried hip pulp.

1605. RUBIN, B. A., ARCHOVSKAJA, E. V., AND PROSKURNIKOVA, T. A. 635.937.34: 577.17
Vitamin C and the oxydative acidity of plant tissues. IV. The role of ascorbic acid in the wild rose. [Russian, English summary.]
Biohimija, 1946, **11**: 349-58, bibl. 10.

The pericarp tissues of wild roses (*Rosa cinnamomea* and *R. spinosissima*) can synthesize ascorbic acid, using sugar as substrate. Most of the ascorbic acid in the fruit seems to be inactive, a stored form, taking no part in respiration. As peroxydase and ascorbic acid oxydase are almost absent from the rose pericarp, it seems probable that the oxidation changes of the vitamin are due to the action of polyphenol-oxidase.

1606. GEIGER-VIFIAN, A., AND MÜLLER, B. 635.976.33: 633.86
Über den Farbstoff der Früchte von *Eleagnus longipes* Gray. **(The pigment in the fruits of *Eleagnus longipes* Gray.)**
Reprint from *Ber. schweiz. bot. Ges.*, 1945, **55**: 320-2, bibl. 2.

The chief component of the colouring matter in the fruit of *Eleagnus longipes* was determined as lycopin. It occurs in such quantity (52 mg. crystallized crude lycopin per 100 g. fresh berries) that the shrub constitutes an excellent source of this compound. Extraction methods are discussed.—Wädenswil Research Station.

1607. NAGHSKI, J., PORTER, W. L., AND COUCH, J. F. 635.976.33: 581.192
Isolation of rutin from two varieties of *Forsythia*.
J. Amer. chem. Soc., 1947, **69**: 572-3, bibl. 11.

The glucoside was isolated from the fresh flowers of *Forsythia suspensa* and *F. fortunei*. In the latter species it was found to diminish with age as it does in buckwheat.—Eastern Regional Research Laboratory, Philadelphia.

1608.

a ALGÉRIE. 633.491: 631.563
Conseils pratiques pour assurer la conservation des pommes de terre. **(Practical hints on the storage of potatoes.)**
Doc. Rens. agric. Algér. Bull. **96**, 1944, pp. 8.

b ALGÉRIE (REBOUR, H.). 633.491(65)
La culture rationnelle de la pomme de terre en Algérie en 1945-1946. **(Common sense potato growing in Algeria in 1945-46.)**
Doc. Rens. agric. Algér. Bull. **115**, 1945, second edition, pp. 14.

c ANON. 633.491-2.76
The fight against Colorado beetle, 1946.
Agriculture, 1947, **54**: 121-4.

d ANON. 635.53
The growing of celery.
Agric. Gaz. N.S.W., 1947, **58**: 3-8.

e BANGA, O. 635.1/7+633.71
Tweede beschrijvende rassenlijst voor groentegewassen (groentegewassen, tuinbouwmais, tabak). **(Second descriptive list of vegetable varieties (vegetables, sweet corn, and tobacco).)**
Inst. Vered. Tuinbouwgewass, 25 Heerenstraat, Wageningen, 1944, pp. 109, f. 0.35.

f BARE, C. O., TENHET, J. N., AND REED, W. D. 633.71-2.7
Effect of the thermal-vacuum process on insects in stored tobacco.
J. econ. Ent., 1946, **39**: 612-3, bibl. 3.
The process destroys insect life.

g BELS, P. J. 635.8(492)
Champignonteelt in Nederland. **(Mushroom culture in Holland.)**
Tuinbouw, 1947, **2**: 31-4.

h BERGER, C. A., AND WITKUS, E. R. 635.25: 581.14
Polyploid mitosis as a normally occurring factor in the development of *Allium cepa* L.
Amer. J. Bot., 1946, **33**: 785-7, bibl. 9.

i BRITTINGHAM, W. H. 635.656
A key to the horticultural groups of varieties of the southern pea, *Vigna sinensis*.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 478-80.

j EIDG. LANDW. VERSUCHSANSTALT ZÜRICH-OERLIKON. 633.491(494)
Das schweizerische Richtsortiment im Kartoffelbau 1946/47. **(Swiss potato varieties 1946/47.)**
Reprinted from "*Die Grüne*", 1946 (?), pp. 7.

k GARDNER, C. H. 635.1/7
Market gardening on heavy land.
Agriculture, 1946, **53**: 389-92.

l HARRISON, P. K. 635.34/35: 632.7
Insects attacking cole crops in Louisiana.
J. econ. Ent., 1946, **39**: 820-1, bibl. 1.

m HARTMAN, J., AND STAIR, E. C. 635.64: 519
Correlation of means and standard deviations in tomato field experiments.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 337-40, bibl. 2.

n JOHNSON, M. A. 635.64: 581.41
On the occurrence of xylem associated with the strands of internal phloem in the tomato.
Abstr. *Amer. J. Bot.*, 1946, **33**: 522.

o KRANTZ, F. A. 633.491: 631.523
Potato breeding methods. III. A suggested procedure for potato breeding.
Tech. Bull. Minn. agric. Exp. Stat. **173**, 1946, pp. 24, bibl. 52.

p LECLERG, E. L. 633.491: 581.192
Comparative dry-matter content of varieties of Irish potatoes grown in Louisiana.
Amer. Potato J., 1947, **24**: 73-6.

q NYHLÉN, Å. 635.64: 631.521.3
Försök med drivtomat vid Rastaborg 1943-1945. **(Trials with glasshouse tomato varieties at Rastaborg, Sweden, 1943-1945.)** [English summary 1 p.]
Reprinted from *Årsskr. Alnarps Lantbruks-, Mejeri-Trädgårdsinst.*, 1946, pp. 121-33, bibl. 17, being *Meddel. Trädgårdsförs.* **34**.

r PETERSSON, G. 633.491: 631.521
Sortförsök med potatis vid Statens försöksgård Ugerup under åren 1941-1945. **(Swedish potato variety trials at the Government experimental farm at Ugerup 1941-1943.)** [English summary 1½ pp.]
Meddel. JordbrFörsöksanst. LantbrHögskol **18**, 1946, pp. 31.

s ROMNEY, V. E. 633.913-2.7
Insects found on guayule in northern Mexico.
J. econ. Ent., 1946, **39**: 670-1, bibl. 1.

t SMITH, J. E., JR. 631.544
The Missouri concrete greenhouse bench.
Bull. Mo. agric. Exp. Stat. **496**, 1946, pp. 16.

u SMITH, G. M. 582.651
On the reproduction of some Pacific coast species of *Ulva*.
Amer. J. Bot., 1947, **34**: 80-7, bibl. 16.

v TRAUB, H. P., SLATTERY, M. C., AND WALTER, E. D. 633.913: 581.192
Fructose and other monosaccharides in guayule.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 358-60, bibl. 10.
Only preliminary results.

w WALLIS, R. L. 632.752: 633.491
Seasonal occurrence of the potato psyllid in the North Platte Valley.
J. econ. Ent., 1946, **39**: 689-94, bibl. 6.

x WEST, F. T. 635.64: 632.753
Ecological effects of an aphid population upon weight gains of tomato plants.
J. econ. Ent., 1946, **39**: 338-43, bibl. 2.
Heavy infestation reduces weight gains.—Ohio.

FLORICULTURE.*

1609. PRESTON, I. 635.923(71)
Herbaceous perennials for Canadian gardens.
Publ. Dep. Agric. Canada **784**, 1946, pp. 91, being *Fmrs' Bull.* **138.**
Herbaceous perennials for Canadian gardens, from *Achillea* to yucca, are described on 60 pages. A further 17 pages are devoted to lists of plants recommended for certain situations (dry; with very little sun; bulbs for perennial border) and for 23 different areas of the Dominion. The remaining chapters contain a plan for the planting of a perennial border, general instructions on cultivation, propagation, etc., and an index.

1610. HUDSON, J. P. 635.937.17
Hydrangeas.
N.Z. J. Agric., 1947, **74**: 109-12.
The cultivation of hydrangeas is very fully described. No disease of hydrangeas is recorded in New Zealand and the only pest recorded is the apple mealy bug, which can be controlled by spraying with nicotine sulphate (2 oz. of soap, dissolved in a little hot water and added, with 1 fluid oz. of nicotine sulphate, to 4 gal. water), or by the use of summer spraying oil diluted to a strength of 1 part in 100 of water.

1611. SIMONET, M. 635.939.9: 547.944.6
Production d'amphidiploides fertiles et stables par intercroisements d'espèces rendues autotétraploides après traitements colchiciniques (*Lobelia syphilitica* L.×*L. splendens* Willd. var. Queen Victoria Hort.). **(Producing fertile and stable amphidiploids by intercrossing species rendered autotetraploid by colchicine treatment.)**
C.R. Acad. Agric. Fr., 1947, **33**: 121-3.
The author has produced experimentally an amphidiploid which is highly fertile and almost stable in its progeny; it can be considered a new species and the name *Lobelia vedrariensis* is proposed for it, a description to appear later.

1612. MCCLELLAN, W. D. 635.936.751: 632.4
Efficacy of certain soil fumigants and fertilizers against crown rot in annual larkspur caused by *Sclerotium rolfsii*.
Phytopathology, 1947, **37**: 198-200.
Of soil fumigants used chloropicrin gave excellent control of *Sclerotium rolfsii*, while Iscobrome No. 2 and carbon disulphide gave fair control. Three side dressings with ammonium nitrate totalling 150 lb. nitrogen per acre also gave excellent results, but, with the exception of Uramon at 300 lb. of nitrogen per acre, none of the other nitrogen-carrying fertilizers was more effective statistically than no treatment.

1613. LIHNELL, D. 635.939.98: 632.8
Bladrullning hos cinerarior. **(Leaf curl of cineraria.)**
Växtskyddsnotiser, 1946, No. 5, p. 80.
A leaf curl disease of cineraria is described, illustrated and discussed. So far, no pathogen has been discovered and no physiological cause is apparent. The Plant Protection Station, Stockholm, asks growers to send affected plants in order to investigate the disease on a larger scale.

1614. ŠČEGLOVA, O. A. 614.014.44: 631.544
The influence of light on root formation in the cuttings of certain hothouse plants. [Russian.]
A symposium on scientific work carried out at Leningrad, 1941-43, 1946, pp. 239-44, bibl. 2. Komarov bot. Inst., Acad. Sci., U.S.S.R., Leningrad.
To determine the effect of direct and indirect red rays, experiments were carried out with *Buxus sempervirens*, *Forsythia suspensa*, *Camellia japonica*, *Ligustrum japonicum*, *Begonia credneri* and *Perilla ocymoides*. In 1942 *B. sempervirens*, *F. suspensa* and *C. japonica* were exposed for a period of 20 days (3-23 July) to red rays; in *B. sempervirens* the formation of subsidiary roots occurred on 8 September, but no roots were formed at that time in the controls; on 23 July large roots were formed in *F. suspensa*, whereas in the controls hardly any root development was noticeable; in *C. japonica* a good callus but no roots were formed by the second half of August. In 1943 the remaining 3 plants were exposed to direct influence of red rays with the following results: no appreciable stimulation of root formation, in comparison with the controls, was found in *B. credneri*; in experimental *P. ocymoides* plants root formation was more abundant than in the controls; the greatest effect was produced in *L. japonicum* in which the roots were developed to a far greater extent than in the controls grown in water under normal daylight. Further experiments indicated that *F. suspensa* grown under an 8-hour day rooted well, while in *B. sempervirens* and *C. japonica* there was only a good callus but no roots at the end of the experiment.

1615. HODGES, A. J. 551.453: 635.9
Cultivation of the xerophytes.
J. roy. N.Z. Inst. Hort., 1946, **15**: 2: 13-18.
A general account of succulent plants cultivated as ornamentals, with notes on their habits, soil requirements and general treatment. It contains an abridged list of those genera that include the common and the rarer succulents.

1616. STOUTEMYER, V. T., AND CLOSE, A. W. 612.014.44: 631.535
Rooting cuttings and germinating seeds under fluorescent and cold cathode lighting.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 309-25, bibl. 12.
Experiments carried out at Glenn Dale, Md, with various ornamentals, *Citrus* spp. and *Cinchona* spp. are here discussed. The authors summarize as follows: "Opaque structures are practicable for various operations in propagation. They aid in eliminating difficulties arising from fluctuations in temperature and humidity. The exact control of light quality, intensity, and period of illumination is made possible. Radiation in the orange-red end of the spectrum favors rooting of cuttings. Satisfactory rooting can be obtained under relatively low light intensities, but much more light is required for starting seedlings. A certain amount of blue light is necessary for the production of short, stocky seedlings."

*See also 1328, 1393.

1617. Ossiannilsson, F. 632.754: 585.94
Orkidéstinkflyet—en icke önskvärd utlänning. **(The orchid pest *Tenthecoris bicolor*—an undesirable alien [in Sweden].)**
Växtskyddsnotiser, 1946, No. 4, pp. 55-6.
The pest *Tenthecoris bicolor*, of the family *Miridae*, of rare occurrence in European orchid houses, was introduced to Sweden in 1946 with imports of *Cattleya* species from Brazil. The insect damages its host by numerous stings causing white spots on leaves and shoots and, in more severe cases, death of the plant. In view of the susceptibility of orchids to fumigation and spraying, control is difficult.

1618. Lounsky, J. 632.944: 635.939.124
Het ontsmetten van tuinbouwplanten met hun wortelaardkluiten en meer in het bijzonder van de Azalea. **(The disinfestation of horticultural plants with their clod of soil, particularly azaleas.)**
Parasitica, 1945, **1**: 113-31, bibl. 28.
The investigation described arose out of the U.S.A. Quarantine Act No. 37 of 1919 which aimed at preventing the introduction of dangerous parasites and insects, particularly by forbidding the importation of plants with soil round their roots. This was a great blow to the Belgian horticultural export trade, so research was started to find some method of treatment which would permit horticultural products to be guaranteed free from parasites. It was found eventually that fumigation by methyl bromide in a vacuum yielded the desired results.

1619. Audus, L. J. 635.976.4: 612.014.44
The effects of illumination on the respiration of shoots of the cherry laurel.
Ann. Bot. Lond., 1947, **11**: 165-201, bibl. 21.
The stimulation, by exposure to light of various intensities for various periods, of the respiration of cut shoots of cherry laurel [*Prunus laurocerasus*] in the dark, was estimated. Light may destroy a competitive depressant of the hydrolysis enzyme system and so increase the supply of hexose sugars for respiration or it may depress oxidative anabolism to the advantage of oxidative respiration; the first theory fits the data better.

1620. Vanderwalle, R. 635.976.4: 632.4
Une affection maculicole de *Laurus nobilis* causée par un champignon nouveau. **(A leaf spot disease of laurel caused by a new fungus.)**
Parasitica, 1945, **1**: 145-51, bibl. 3.
A disease of laurel cuttings and young plants has been observed during winter in greenhouses near Bruges. Infected leaves are at first spotted, but later, as the disease progresses, they become silvery above and brown below. The lower surface bears the fructifications of a fungus which is considered to be a new species and is described under the name *Tetracytum lauri*. The fructifications are similar to those of *Cylindrocladium* (see *H.A.*, 15: 100) but the spores are 4-celled. The disease seems to be due to deficient heating imposed by the fuel restrictions.

1621. Page, J. O. 635.944
Lincolnshire bulb flowers.
Agriculture, 1947, **54**: 165-7.
Difficulties of the Lincolnshire bulb growers have in the past few years been immense, but the future is full of promise. The area under bulbs should reach 2,000 acres this year. The soil of Holland county is admirably suitable for bulb production for all classes of tulip, especially Darwins, and all daffodils except the polyanthus types. Much research will be needed to guide future development, to lengthen the flower growing season and to ensure uniformity of product. An expansion in the production of hyacinths is very desirable. Work is needed too on the production of implements for mechanical planting and lifting and to discover other devices for lowering costs of production.

1622. Algera, L. 635.944: 631.8
Over de opname van voedingstoffen uit den bodem door de tulp. **(The uptake of foodstuffs from the soil by tulips.)**
(*Publ.*) *Inst. Phytopath. Lab. Bloembollenonderz., Lisse*, **74**, 1945, 432-8, reprinted from *Landbouwk. Tijdschr.*, 1944.
Experiments were carried out to ascertain the relative amounts of nutrients taken up from the soil by tulips throughout the year. Bulbs were analysed at 7 different times at intervals of 5 to 9 weeks to determine the fresh and dry weights and their relation, the ash in mg., the nitrogen in mg. The results are tabulated. It is concluded from the data that the tulip begins to take up nutrients from the soil about the beginning of March. There is thus a long interval between the autumn application of manures and the time when the plants begin to make use of them. It is suggested that it might be advisable to reduce the autumn applications and increase those of spring.

1623. Algera, L. 581.036: 635.944
Over den invloed van de temperatuur op de koolhydraatstofwisseling en ademhaling bij de tulp en de hyacinth en de beteekenis daarvan voor de ontwikkeling der plant. **(The effect of temperature on carbohydrate metabolism and respiration in tulip and hyacinth and its importance to plant development.)**
Meded. Landbhoogesch. Wageningen **48**, 1947, pp. 87-183, bibl. 37.
The development of organs in tulip and hyacinth occurs mostly after lifting. It is most rapid in tulip at about 20° C. As soon as they are formed the organs begin to expand, and most quickly at 13° C. The hyacinth behaves fundamentally like the tulip but its optimum temperature is higher. Determinations were made of the concentration of reducing sugars, sucrose, inulin and starch and of respiration rates. The data obtained are set out in 34 tables. The concentration of reducing sugars is nearly the same in hyacinth bulbs as in those of tulips and at a low temperature is somewhat higher than at a high temperature. There is less sucrose in the hyacinth bulb than in the tulip bulb but during cooling it increases in the same way. The hyacinth has a much higher inulin concentration than the tulip, but its starch content is lower. In the tulip bulb the respiration rate decreases after lifting, but from the beginning of the extension of the organs it increases again. In the hyacinth too the respiration rate decreases after lifting and then remains constant for some time, and diminishes after lowering of temperature.

1624. McClellan, W. D., and Stuart, N. W. 635.944: 632.48
The influence of nutrition on fusarium basal rot of narcissus and on fusarium yellows of gladiolus.
Amer. J. Bot., 1947, **34**: 88-93, bibl. 18.
Mycelial growth *in vitro* of *Fusarium oxysporum* f. *narcissi* (Cke. et Mass.) Snyder and Hansen was stimulated by growth-regulating substances and purines, and was greatest where N levels were highest. Field data at Beltsville, Md, show that inorganic N and P, and treatment of bulbs with indolebutyric acid, naphthaleneacetic acid, naphthalene acetamide, allantoin, guanidine, uric acid, nucleic acid, and a proprietary compound, increased basal rot of narcissus. In Texas gladiolus corms fertilized with blood tankage produced fewer flowers and corms with a higher percentage of *Fusarium* corm rot than those fertilized with the equivalent of inorganic N, or not fertilized.

1625. LeBeau, F. J. 635.944: 632.4
A fungicide for protecting lily bulbs from infection by *Colletotrichum lilii*.
Phytopathology, 1947, 37: 194-6.
It was found that treating infected lily bulbs with Puratized N5E destroyed the disease organism in diseased tissues but

that the treated bulbs received little or no protection from reinfection when planted in infested soil. When, however, that treatment, Puratized N5E at 1-2,000 solution for 48 hours, was followed by dusting with Arasan the result was found to be highly effective.

1626. Limber, D. P. 635.944: 632.4
The observed frequency of mature pycnidia of *Septoria gladioli* on gladiolus corms.
Phytopathology, 1947, **37**: 190-1, bibl. 3.

Of shipments of gladiolus corms received from Holland, England, Australia and Canada, examined in 1946 in New Jersey, 6·6% were infected with typical hard rot symptoms; mature pycnidia of *Septoria gladioli* were found on corms with an advanced stage of the disease.

1627. Dustan, A. G. 635.944: 632.73
Standard control recommendations for the gladiolus thrips.
Publ. Dep. Agric. Canada Div. Ent. **69**, 1947, pp. 6.

Methods of treating the corms with corrosive sublimate, lysol, DDT, naphthalene flakes or calcium cyanide are described. On the first signs of injury on the growing plants these should be sprayed with tartar emetic 1 oz., brown sugar (or honey) 2 oz., water 2½ gal. DDT dust or spray may be used but it is not so effective as tartar emetic. Corms should be stored in a cool place. Where the corms are kept at a temperature of 35° F. for 2 months, or 40° F. for 3 months, all stages of the thrips will be killed, even the eggs.

1628.
a Floto, E. V., and Gudjonsson, G. 635.939.492
Studies on *Nepeta mussinii* hort. A species hybrid of *N. mussinii* Spreng. and *N. nepetella L.*
Yearb. roy. vet. agric. Coll. Copenhagen, 1947, pp. 31-9, bibl. 10.

b Petersen, E. O. 635.939.183
Plant with a history. Wide variations noted in the auricula.
J. roy. N.Z. Inst. Hort., 1946, **16**: 2: 25-31.

CITRUS AND SUB-TROPICALS.*

1629. Anderssen, F. G. 634/635(68)
Horticultural services and research.
Fmg S. Afr., 1947, **22**: 260-8.

Citrus research. The Permanent Fertilizer Project of Nelspruit gave significant results for the 4th year in succession, viz.: (i) ammonium sulphate decreased the yield, the fruit size and the juice content, and increased the acidity and rind thickness of Valencia oranges; (ii) superphosphate and kraal manure produced the opposite effect, having increased the yield, the fruit size and the juice content; and decreased the acidity and rind thickness of the fruit; (iii) potash fertilizers increased the acidity of the fruit. The limiting factor during the first 12 years in the life of the trees was phosphates. It is anticipated that nitrogen will become the next limiting factor as the trees age. Results at Rustenburg have shown that the form in which nitrogen is applied is important. Nitrate of soda or calcium nitrate are favoured. Considerable progress was made in developing a technique for analysing citrus leaves with a view to diagnosing nutritional requirements. Other research projects are mentioned, including: root and rootstock investigations, water relationship studies and plant breeding.

Mangoes. The first known mango nursery in the Union has been established at Nelspruit Subtropical Horticultural Research Station.

Papaws. An outstanding variety, Hortus Gold, has been produced at Nelspruit.

Tung. Rootstock trials with *Aleurites fordii* and *A. montana* have largely substantiated earlier results.

Spinach and lettuce. Chlorosis investigations in the Transvaal have shown that this malady is due to high soil pH and an excessive concentration of brak salts.

Beet. An explanation is given of the low percentage germination of beet seed in standard germination tests compared with soil tests.

Onion thrips. Top-dressings of inorganic nitrogen fertilizers made it possible for onions to withstand thrips attack without the necessity for expensive spraying.

Vegetables. An account is given of breeding and/or selection work with carrots, beets, tomatoes, egg-plant, peas, etc. New strains of tomatoes immune to bacterial wilt have been produced. Interesting results have been obtained in breeding new varieties of Hubbard squash.

Pineapples. In fertilizer trials at Bathurst Pineapple Station, guano has given the best results to date. Forty-six named pineapple varieties are under trial. Selected strains were distributed for trial. Seedlings of numerous crosses between Queen and Smooth Cayenne are under trial at Nelspruit and Bathurst.

Deciduous fruit. An outline is given of nutrition studies and of rootstock and root investigations. Selected peach strains which ripen at different periods are now available.

Seed production. The plans begun during the war for building up this industry have borne fruit, so that to-day S. Africa is very largely independent of imported vegetable seed.

1630. Service de l'Horticulture, Maroc. 634.3(64)
Les agrumes au Maroc. **(Citrus fruits in Morocco.)**
Service de l'Horticulture, Rabat, 1947, pp. 64.

Signed articles on the following subjects are incorporated in this work: world citrus production, citrus growing in Morocco, irregular fruiting of the Clementine, citrus scale-insects and the disorders and diseases of citrus.

1631. Friend, W. H. 634.3(764)
Citrus orcharding in the Lower Rio Grande Valley of Texas.
Circ. Tex. agric. Exp. Stat. **111**, 1946, pp. 38.

From small home plantings prior to 1916 citrus production in the Rio Grande Valley of Texas has developed into a major industry yielding a 28 million box crop in 1945, almost half of which was marketed as canned juice. Plantings are about equally divided between oranges of all types and pink-fleshed grapefruit. Conditions in the Valley are so favourable for citrus growing that yields in 1945 reached an average of 240 boxes per acre and that well-managed orchards " may be expected to yield substantial returns on invested capital, even should the orchard price of fruit drop 50% below the levels which prevailed during the 1940-1946 period ". The detailed recommendations made in respect of site selection, raising and planting of trees, frost protection, irrigation, and all other phases of cultivation are based on the experience acquired at the Lower Rio Grande Valley Experiment Station (Substation No. 15, Weslaco, Texas) during the last 20 years, supplemented by the experience of local growers and of scientists elsewhere.

1632. De Poerck, R. 634.3(675)
Note contributive à l'amélioration des agrumes au Congo belge. **(The improvement of citrus in the Belgian Congo.)**
Publ. Inst. nat. Étude agron. Congo belge (I.N.E.A.C.), Sér. tech. **33**, 1944, pp. 80, bibl. 35, 60 fr.

*See also 1348, 1616.

The bulletin opens with a description of the climate and soil of Vuazi citrus experiment station which is followed by a note on the progress of citrus improvement and a useful list of over 30 introduced varieties, with a description of each. The author concludes with a consideration of possible future improvement in oranges, pomelos, mandarins, lemons and rootstocks. It is suggested that seedling orchards of rough lemon and Japanese citron from a variety of sources should be established now so as to ensure a supply of genetically different material for future work.

1633. Vavilof, N. I., and Nikitina, I. L. (Editors). 634.334 +633.85 +633.72
The cultivation of lemon and tung trees and the production of tea seed. [Russian.]
Reports of the 4th travelling plenary session of the section of sub-tropical crops held at Batoum 15-19 October, 1938, Lenin Academy of Agricultural Sciences, Moscow, 1940, pp. 122 [received 1947].

This is in three parts. In the first, citrus cultivation is considered with particular reference to the possibility of extending it into colder districts. Among measures expected to achieve this are the crossing of *Poncirus trifoliata* with *Fortunella* and other citrus species, horizontal training of trees, frost protection by mats and heaters and the control of cold air currents by tree planting.

The second part concerns the cultivation of tung trees. Particular importance is laid on the necessity for growing only the best type of tree—that bearing female flowers—for vegetative propagation of tung trees, and for finding the most suitable sites and regions where tung trees can be cultivated without succumbing to cold. Little, as yet, has been done to evolve new varieties; but the hybridization of *Aleurites fordii* and *A. cordata* is being tried. The former species is the more productive and hardy, but the latter flowers later and so avoids danger from spring frosts.

The third part consists of two contributions: the first on the production of tea seed with a view to its introduction to new districts, the second on tea seed production in Georgia. In addition, T. K. Kvaracheli deals with vegetative methods of propagating tea. Instructions are given for the establishment of a tea-seed plantation, gathering the seed, and improving existing tea plantations.

1634. Nottage, I. L. 634.323
Wheeny grapefruit promises to lengthen season.
N.Z. J. Agric., 1947, **74**: 375.

The Wheeny grapefruit is said to have been a seedling which grew in the Wheeny Creek district of Australia. About 12 years ago a few trees of this variety were brought into New Zealand, and it now bids fair to become a popular grapefruit with the public. It is of good quality and matures from mid-October to the end of December in New Zealand citrus districts. The fruit is large and is usually carried in clusters; the rind is thin, the flesh of fine texture, full of juice with very little rag, seeds are very numerous but small. The flavour is distinctive, a pleasant grapefruit of bitter-sweet blend; immature fruit has a most unattractive flavour. There are now some hundreds of trees about 6 years old on *trifoliate* stocks, with a much smaller number on sour orange.

1635. Furr, J. R., and Reece, P. C. 634.3: 545.81
Identification of hybrid and nucellar citrus seedlings by a modification of the rootstock color test.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 141-6, bibl. 1.

The colour test introduced by Halma and Haas, *Plant Physiol.*, 4: 265-8; see also Marloth, *J. Pomol.*, 14: 1-8; *H.A.*, 6: 360, was adapted at the U.S. Subtropical Fruit Field Station, Orlando, for the rapid testing of citrus leaves, when the method was applied in an attempt to distinguish between hybrid and nucellar seedlings. The test was found to help in the selection of zygotic seedlings when roguing nucellar seedlings.

1636. Haas, A. R. C. 631.541.11: 634.3: 581.192
Influence of the rootstock on the composition of citrus leaves and rootlets.
Soil Sci., 1945, **60**: 445-61, bibl. 8.

The influence which citrus rootstocks exert on the accumulation of boron in the leaves of the scion, as previously shown by the author (*H.A.*, 16: 420), raised the question as to whether the rootstock effects are limited to boron or are operative in some degree on other nutrient elements. The present paper shows that the rootstock does affect the accumulation of other elements. More calcium and magnesium and less potassium were found in grapefruit and navel and Valencia orange leaves of trees on sour than on sweet orange rootstocks. Valencia oranges leaves of trees on shaddock, trifoliate orange, rough lemon, and Cleopatra mandarin are relatively high in magnesium content, whereas those of trees on grapefruit rootstocks are relatively low. The highest total nitrogen content in Valencia orange leaves was found on trees on Koethen sweet orange rootstock. There were other differences in relation to the accumulation in leaves of total sulphur and total phosphorus. The rootlets of sour orange with Valencia scions were higher in calcium and lower in total nitrogen, sulphur, and phosphorus than the rootlets of Koethen sweet orange rootstock. It is concluded that for orange trees the relative order or type of absorption of nutrient elements, which seedling trees impose upon their own leaves, resembles in certain respects the order which these seedlings, as rootstocks, impress upon the leaves of the scion variety.

1637. Division of Horticulture, N.S. Wales. 634.3-2.4
Use of *Trifoliata* stock for citrus.
Agric. Gaz. N.S.W., 1947, **58**: 25.

A brief note by the Division of Horticulture on the advantage of using *trifoliata* stock for citrus in areas where *Phytophthora* root-rot occurs.

1638. King, G. S. 634.3: 581.192
Study of citrus vesicle constituents stained by fat staining reagents.
Abstr. *Amer. J. Bot.*, 1946, **33**: 823.

Deposits and tissue structures stained by osmic acid and a number of oil soluble dyes are found peripherally in the vesicles of citrus fruits and in spaces between them; the structures contain suberin.—Bur. agric. ind. Chem., New Orleans.

1639. Hume, J. E. 634.3-1.541.5
Budding of citrus trees.
N.Z. J. Agric., 1947, **74**: 157-9.

An illustrated account. It states that good bud-sticks are well-rounded and mature, about lead pencil thickness, not more than 1 year old and taken from healthy trees that have carried good crops of fruit, true to type, for several years. Avoid taking buds from suckers, water shoots, or any wood showing malformations or excessive thorns. The author's rules for budding are: (1) Use budwood only from specially-selected, proven trees. (2) Carry out all operations with speed and precision. (3) Take particular care with tying to exclude air and moisture. The buds should be examined 2 or 3 weeks after budding and the ties loosened or cut on the opposite side to the bud to avoid restriction of the sap. If budding tape or rubber strips have been used they may be left unattended longer. Buds that are healthy and growing can be recognized by their green appearance. If the petiole is still attached it will be pale and will drop off at the slightest touch.

1640. Oberholzer, P. C. J. 634.3(68)-1.8
The present status of citrus nutrition in South Africa.
Bull. Dep. Agric. S. Afr. **271**, 1946 (?), pp. 14, bibl. 32.

The author presents a survey of the present status of citrus

nutrition in South Africa, discussing separately the question of soil reaction and the individual nutrients. The long-term fertilizer trial, laid down at Nelspruit in 1933, is practically the only one of its kind in the country. Since conditions vary largely from area to area, it seems necessary for the development of satisfactory fertilizer programmes that long-term trials should be initiated on all the more important citrus soils. From the detailed discussion of the problem the following points may be noted here: (1) The nutritional troubles encountered with citrus trees in South Africa are confined mostly to acid soils (pH 4·6·5), characterized by a low supply of exchangeable bases and exceedingly poor absorptive and buffer capacities. Although theoretically a more favourable base status can be reached by various means, the author does not view the future of citrus orchards planted on such soils with much optimism. (2) For several good reasons kraal manure is recommended as the best source of nitrogen, although the desirable seasonal variation in available nitrates (a large supply during blossoming and fruit setting and practically none during the ripening stages) can hardly be achieved in this manner. As a rule, trees in South Africa should be given ½ lb. actual nitrogen a year if under 5 years and 1 lb. at the age of 5-10 years. Older trees may show increased yields following applications of 2 lb. Exact amounts cannot be arrived at without experimenting in each case. (3) Most South African soils are markedly deficient in available phosphates, but the response from phosphorus applications cannot be compared with those obtained from nitrogenous fertilizers. On the other hand, phosphorus is known to reduce the acid content of the juice. Phosphatic manuring appears advisable, where cover crops are grown in citrus orchards and where difficulty is experienced with fruit quality. (4) Up to the present, potassium manuring has not been beneficial, but in future, in view of the high potash requirements of citrus trees, this mineral is likely to become a limiting factor. (5) In the author's opinion calcium may well be a limiting factor in the fertility of many citrus soils, especially in the acid, weakly buffered soils of the Transvaal and of the south-western Cape Province. Owing to its immobility in such soils, however, lime can hardly be made accessible to deep-rooting crops, such as citrus. (6) Although foliar sprays will correct magnesium deficiency rapidly, they are not advisable in the long run, since they aggravate the scale problem. Soil applications of magnesium compounds are therefore recommended as a standard practice, all the more so as the use of alkaline materials like dolomite tends to improve soil fertility. (7) Iron chlorosis in citrus occurs chiefly in the eastern Cape Province, where the pH value rises to 8 and higher. Nowhere, however, is the trouble of serious practical importance. (8) Sulphur deficiency has not been found in the field. In the Sundays River Valley sulphur applications have resulted in the reduction of the pH value from 9 to 5. (9) Zinc deficiency is of almost universal occurrence in South African citrus orchards, but it is most prevalent in the Sundays River Valley and adjoining areas. (10) Neither manganese deficiency nor toxicity are of economic importance in South African citrus. (11) Isolated cases of " exanthema ", caused by copper deficiency, have been found in the Sundays River Valley. (12) No case of boron deficiency has been reported. (13) The detrimental influence of ammonium sulphate on acid, weakly-buffered soils is discussed under several headings. Presumably the harmful effects are produced indirectly as a result of changes in the pH relations rather than by toxic action of the sulphate radical.

1641. BENTON, R. J. 634.3-1.8
Manuring of citrus trees.
Agric. Gaz. N.S.W., 1947, **58**: 131-2.

The author's recommendations are as follows: Apply to citrus trees grown inland from 150 to 200 lb. nitrogen per acre per annum on large trees. Apply a similar quantity to trees in less fertile soils on the coast and in addition up to 2 cwt. of potash; variation in the form of nitrogen used each year seems advisable. In all districts encourage a growth of green manure crop—usually in autumn—by applying from 1 to 2 cwt. of superphosphate per acre. Apply nitrogenous fertilizers in late winter or early spring. If a very soluble form of nitrogen is used in very permeable soils, divide the annual amount for application into two or three portions, applying them in early spring, summer and early autumn for preference, or at least in early spring and summer.

1642. CAMP, A. F. 634.3-1.811.6
Magnesium in citrus fertilization in Florida.
Soil Sci., 1947, **63**: 43-52, bibl. 9.

Magnesium has always been deficient in the sandy soils of Florida and in many of the calcareous soils also. Some of the soils first used for citrus were higher in magnesium than are those commonly used to-day. This, together with the widespread use of magnesium-bearing fertilizers, produced excellent citrus. Citrus trees deficient in magnesium and carrying a crop of fruit show a yellowing of the leaves during the late summer and early autumn. Such yellow leaves fall as soon as the magnesium is thoroughly depleted. After a drought or a period of cold weather in autumn or winter, leaf fall may be very rapid, so that the fruit is left exposed on defoliated twigs and may be injured by sunburn. There is marked reduction in fruit growth and in the development of sugar and vitamins because there are no leaves to supply the necessary materials. Applications of dolomite on acid soils (pH 4·5 to 5·0) failed to give good results in the first year but effected a marked improvement in the trees the second year, whereas the use of the soluble form (commercial magnesium sulphate) gave good results almost immediately. Where the soil is such that the conversion from water-insoluble to water-soluble is poor, then the necessity for supplying soluble magnesium in the fertilizer becomes great.

1643. PREST, R. L. 634.3-1.542
Citrus pruning.
Qd agric. J., 1947, **64**: 208-11.

An outline of the essential points to be observed when pruning oranges, mandarins and lemons in Queensland.

1644. LEVITT, E. C. 634.3-1.67
Irrigation and drainage in coastal citrus orchards.
Agr. Gaz. N.S.W., 1947, **58**: 21-2.

A short note of warning on the ill-effects from over-watering citrus orchards.

1645. ARNOT, R. H. 634.3-2.19: 631.83
Potassium deficiency in coastal soils. A cause of decline in citrus and passion fruit.
Agric. Gaz. N.S.W., 1947, **58**: 72-4, bibl. 2.

Conditions known as " burnt leaf " in citrus and decline in passion fruit have been shown to be associated with potash deficiency. Citrus trees affected with burnt leaf produce a rather weak growth with small pale leaves that commonly dies back before reaching maturity. Mature leaves turn a rather bright yellow, starting at the tip, and then become brown with a yellow band in the middle. In an experiment described, trees deprived of potash developed those symptoms while trees receiving potash grew satisfactorily without showing the symptoms. The leaves of trees deprived of potash contained about 0·2% of potassium, those of trees receiving potash about 2%. Decline of passion fruit vines is accompanied by yellowing and scorching of the leaves; the leaves of affected vines contained 0·2 to 0·3% of potassium, those from healthy trees 0·9%. A small trial using potash has given promising results.

1646. REUTHER, W., AND CRAWFORD, C. L. 634.3-2.191
Effect of certain soil and irrigation treatments on citrus chlorosis in a calcareous soil: II. Soil atmosphere studies.
Soil Sci., 1947, **63**: 227-40, bibl. 20.

Young Marsh grapefruit trees were set out on a calcareous soil in a plot design which made it possible to study the effects of 8 soil treatments at 2 soil moisture levels. When soil moisture was maintained at a relatively low level by infrequent irrigation, the application of water was followed by a temporary reduction in oxygen and increase in carbon dioxide concentration in the soil atmosphere. When the soil was kept at a higher moisture level by more frequent applications of water, this modification occurred more frequently, and the oxygen concentration never reached quite so high a level between irrigations as it did under low-moisture conditions with longer intervals between irrigations. Likewise, carbon dioxide fluctuated between a higher minimum level and about the same maximum level with greater frequency when irrigation was applied more frequently. Much higher levels of oxygen and lower levels of carbon dioxide concentration were found in the cooler winter months than in the hotter summer months. The depression of O_2 concentration and the elevation of CO_2 were much greater following the application of irrigation water in summer than in winter. The incorporation of large quantities of hay, manure, or sulphur in the soil greatly reduced the concentration of O_2 and increased that of CO_2 in the soil atmosphere. There is no consistent relationship between the composition of the soil atmosphere and the severity of chlorosis, even though differential irrigation and soil treatments produced profound effects on chlorosis. The validity of the hypothesis that calcareous soil becomes alkaline as the moisture content is increased is questioned. [From authors' summary.]

1647. Scott, F. M., and Baker, K. 634.31-2.19
The anatomy of the Washington navel orange rind in relation to water-spot.
Abstr. *Amer. J. Bot.*, 1946, **33**: 826.
Localized oedema of the mature rind is the first symptom of water-spot injury, which may or may not be followed by rind-cracking during winter rains in California. The tendency of the epidermis to crack is evident in young fruits, but incipient cracks are healed by concurrent cutinization. The cracks may heal in dry weather, but in continued rain remain open and admit fungal spores. There are no significant anatomical differences between the Washington navel and other varieties less susceptible to water-spot.—Los Angeles, Calif.

1648. Wallace, J. M. 634.3-2.8
The use of leaf tissue in graft-transmission of psorosis virus.
Phytopathology, 1947, **37**: 149-52.
Positive results were obtained by placing small pieces of leaf tissue from psorosis-affected citrus trees under bark-flaps of healthy citrus trees, and psorosis symptoms appeared in 2 to 4 weeks. With plants in which this method of grafting can be used for virus transmission, inoculation procedure is simplified and inoculations can be made rapidly.

1649. Wallace, J. M., and Fawcett, H. S. 634.31-2.8
Quick decline of orange trees—a virus disease.
Science, 1947, **105**: 315-6.
Recent results of experiments in southern California have shown that the highly destructive quick-decline disease of oranges is infectious, and these new results, taken with those from other experiments, indicate that it is a virus disease.

1650. Levitt, E. C. 634.3-2.4
Armillaria root rot control. Use of a water jet to expose citrus crown roots.
Agric. Gaz. N.S.W., 1947, **58**: 67, 71.
A method of controlling *Armillaria* root rot in citrus orchards is described. The crown roots are bared of soil quickly and easily with an ordinary motor spray outfit using a water jet. The exposure of the roots prevents the extension of the fungus from an infected root to the crown, thus saving the tree from death. The method described i valuable, since the necessary equipment is either already available on the orchard or can be hired at a relatively low cost.

1651. Hopkins, E. F., and Loucks, F. W. 634.31-2.4
Effect of heavy metals on susceptibility of oranges to stem-end rots.
Abstr. *Amer. J. Bot.*, 1946, **33**: 837.
Treatments with soluble copper compounds increased infections in oranges by *Diplodia natalensis* and *Phomopsis citri*, especially when copper sulphate was combined with sodium thiosulphate to give cuprous copper. Mn, Zn, Fe and Al likewise increased the percentage of rots but not so markedly as Cu. Zn and Fe gave a four-fold increase over the checks, while Ca and Mg caused no significant change.—Florida Citrus Experiment Station.

1652. Dibar, P. A. 634.3: 632.752
Principales cochinillas que parasitan las plantas citricas. **(The chief scale insects of citrus.)**
Bol. Frut. Hort. Flor. B. Aires, **94**, 1946, pp. 15.
Nine scale insects of citrus are described and an account is given of measures for their control. The best results have been obtained with a white oil emulsion at 1½ to 3%. Types of machines for applying it are discussed. Biological control is slight; some success has been attained with the parasite *Rodolia cardinalis* against *Icerya purchasi*.

1653. May, A. W. S. 634.3-2.752
The scale control programme in citrus orchards.
Qd agric. J., 1947, **64**: 2: 75-7.
Instructions are given for the preparation and application of single and combined sprays for use against the several scale-insects found on citrus in Queensland.

1654. Osburn, M. R., and Mathis, W. 634.3-2.752
Effect of cultivation on Florida red scale populations.
J. econ. Ent., 1946, **39**: 571-4, bibl. 5.
Intensive cultivation, by double-disking between and hand hoeing round the trees 5 times a year, stimulated the growth of oranges and increased infestation with Florida red scale.—St. Lucie County, Fla.

1655. Gunther, F. A., and others. 632.951: 634.3
Persistence of certain DDT deposits under field conditions.
J. econ. Ent., 1946, **39**: 624-7, bibl. 7.
Mature orange and lemon trees were sprayed with DDT in kerosene emulsions with various combinations of aluminium stearat and tetralin or Velsicol AR60. The concentration of DDT on the leaves was followed for 86 days: analyses made as soon as the leaves were dry did not always agree with those made 24 hours later, because the kerosene penetrates the leaves and re-issues slowly. The rate of loss of DDT was similar for all treatments; the residual effect in preventing settling and development of red scale crawlers persisted about 3 weeks.—Southern Calif.

1656. Ebeling, W. 634.3-2.752
Sub-soil bark injury from kerosene spray.
J. econ. Ent., 1946, **39**: 795-7, bibl. 2.
In spraying citrus with DDT in kerosene against red scale, injury may be avoided by using that fraction of commercial kerosene which has a boiling point above 375° F.—Los Angeles, Calif.

1657. Anderson, W. S. 634/635(75/76)
Some post-war problems of Southern horticulture.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 488-98.
A stimulating survey of the signs of the times as they are likely to affect horticulture in the southern states of the U.S.A. and incidentally a very much wider field. The problems discussed are conveniently grouped as relating to (1) production, (2) marketing and (3) education.

1658. PICKETT, B. S. 631.4: 634.3 + 635.1/7
Management of soils in the Lower Rio Grande Valley.
Circ. Tex. agric. Exp. Stat. **110**, 1946, pp. 13.
The suggestions made are based on the experimental work of Substation No. 15, Weslaco, Texas, and on the observation of successful irrigation, manurial and cultivation practices employed by vegetable and citrus growers in the Lower Rio Grande Valley. The main problem for irrigation is the application of sufficient water to heavy soils, especially when there are patches of it in one orchard block. Water deficiency on such soils leads to salt accumulation and, for instance, to chloride poisoning. Deep cultivation on heavy orchard soils, where feeder roots remain near the surface, has caused heavy damage to growers; but also for light soils shallow cultivation is recommended. Both light and heavy soils require the same amount of fertilizer. On the soils in this area potash applications may be dispensed with, whereas nitrogen, alone and in combination with phosphorus, has proved beneficial to vegetables and citrus.

1659. KOSOV, V. 633/635: 631.53
Propagation of subtropical crops in Soviet Central Asian Republics.
(*Mimeograph*) *Soviet News Press Service Dep.*, London, January, 1947, pp. 5.
Large tracts of steppe-land, deserts and semi-deserts which stretch through these republics are suitable for a number of subtropical crops to which the Soviet government attaches great importance. A research station was formed in 1934 to study the question of suitable crops for the arid subtropics. In recent years work has been directed towards plant selection and improved cultivation of existing crops and the introduction of new crops, such as geranium, sugar-cane, olives, jute, persimmon, Chinese dates and guayule.

1660. DIVISION OF HORTICULTURE, PRETORIA. 633.492
The sweet potato.
Fmg S. Afr., 1946, **21**: 662-4.
Farmers are asked to increase their sweet potato production to supplement the wartime diet. The requirements of the crop, which has no serious pests or diseases in the Union, are set out.

1661. LUTZ, J. M., DEONIER, M. T., AND STEINBAUER, C. E. 633.492-1.532.2
Studies on possibilities and limitations of the seed piece method of planting sweetpotatoes.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 443-8.
Stands resulting from seed piece propagation of sweet potatoes were almost always worse than those obtained from the control method using Porto Rico and Triumph roots at Meridian, Mississippi.

1662. THUNG, T. H. 633.492-2.4
Heksenbezem bij bataten (*Ipomoea batatas*), een virusziekte. **(Witches' broom disease of sweetpotato—a virus. disease.)**
Landbouw, 1947, **19**: 286.
A brief note on the witches' broom disease of sweet potatoes. The disease has been found to be a virus disease, not sap-transmissible, though it can be transmitted by grafting.

1663. PERSON, L. H. 633.492-2.3
Soil rot of sweet potatoes and its control with sulphur.
Bull. La agric. Exp. Stat. **408**, 1946, pp. 15.
This bacterial disease of sweet potatoes does not grow at a soil pH below 5·2. It was more severe in Louisiana in years when the rainfall was low during the time when the young plants were producing roots. In wet years, losses were slight. Losses were practically eliminated, even in dry years, by the application of 500-800 lb. sulphur per acre. The effect was to reduce the soil pH to about 5·0, and it lasted 4-6 years.

1664. SHAW, J. G. 632.77: 634.1/7
Hosts and distribution of *Anastrepha serpentina* in north eastern Mexico.
J. econ. Ent., 1947, **40**: 34-40, bibl. 9.
The preferred host plants of this fruit fly in N.E. Mexico are tropical fruits, chiefly of the order *Sapotaceae*. Peach, apple, pear and quince are also infested.

1665. STRICKLAND, A. G. 632.77: 634.1/7
Discovery of Queensland fruit fly [*Chaetodacus tryoni* in Adelaide suburbs.
J. Dep. Agric. S. Aust., 1947, **50**: 404.
Two outbreaks of the Queensland fly were discovered in home gardens in Adelaide suburbs in January and February, 1947. This was its first appearance in South Australia. Measures, here described, were taken for its eradication.

1666. SHAW, J. G., AND STARR, D. F. 634.441-2.77
The effect of smoke on the Mexican fruitfly.
J. econ. Ent., 1946, **39**: 526-8, bibl. 4.
Smoke from burning mango leaves, or rice straw, greatly reduced the number of fruit flies trapped in mango trees in Cuernavaca, Morelos, Mexico. The residual effect (up to 3 days) was such that only frequent smoking could protect fruit on trees.

1667. WEBSTER, C. C. 633.85(689.7)
The cultivation of the tung tree in Nyasaland.
Emp. J. exp. Agric., 1946, **14**: 18-24, bibl. 11.
The two species of trees which produce tung oil, *Aleurites fordii* and *A. montana*, were introduced into Nyasaland in 1927 and 1931 respectively. *A. fordii* has proved to be unsatisfactory, and the superiority of *A. montana* has resulted in its being planted almost exclusively since 1936. Since then the total area under tung trees in the protectorate has increased from 624 to 8,349 acres at the end of 1944. The species is monoecious; 40 to 50% of the trees are very predominantly male and bear only a few clusters of fruit, whilst the remainder ("bearers") produce far more female flowers and so set far more fruit. It follows that the vegetative propagation of the best bearing trees offers great possibilities in improving yield, for males would be eliminated and the plantation would consist of clonal material derived only from the outstandingly good bearers. Selection of good mother trees started in 1940. Budding on to seedling rootstocks was found to be a simple matter and the resulting budded plants were easy to handle and transplant (*H.A.*, 11: 898; 12: 1487). 68 clones are now under trial, but less than half are in bearing, and the present paper refers only to the 12 oldest clones planted in 1940. Buddings on *A. montana* stock have significantly outyielded those on seedlings, giving nearly three times as much as those on unselected seedlings. The *A. fordii* stock is exerting a dwarfing effect, and its yield fell below that of the buddings on the *A. montana* stock in the fourth year, and is expected to continue to do so. Seedlings of the candlenut tree (*A. moluccana*) have also been tried as a stock for both *A. montana* and *A. fordii*, but the species appear to be incompatible. Attempts are being made to root clonal material as cuttings. In the older seedling plantations the topworking of the male trees by budding on to the main branches with scion buds from high-yielding mother trees has been found to be a successful means of converting these trees into good bearers. Cultural methods are discussed under nursery work, transplanting, spacing, cultivation, manuring and pollination. No definite conclusions can yet be drawn from an intercropping trial, but results so far show a consistent superiority of the soya-bean plots both as regards yield and vigour, thus indicating the advantage of thorough cultivation with a crop which does not take much from the soil. To ensure adequate pollination a small proportion of early flowering male trees in a budded plantation is desirable, and at present not less than 5% of males is suggested.

1668. STOCKAR, A. 633.85
Comunicación preliminar sobre hibridaciones entre varias especies de Aleurites. **(Preliminary note on crosses between species of *Aleurites*.)** [English summary 8 lines.]
Rev. argent. Agron., 1947, **14**: 33-8, bibl. 6.
An account of work in Santo Pipó on crossing and back-crossing between *Aleurites fordii*, *A. montana* and *A. cordata*. Tung breeding is a lengthy process, but the first crosses are fertile.

1669. KOŽIN, A. E., AND KLIMENKO, K. T. 633.85-1.523
First results of interspecific hybridization of tung tree at the Batumi botanical garden. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1946, No. 11-12, pp. 21-4.
An account is given of hybridization experiments with *Aleurites fordii* and *A. cordata*. The technique of crossing is not complicated. The flowers are large and the male and female buds can be distinguished by feeling them—the former are soft, the latter firm. The female flowers can be isolated by covering them with muslin bags of double thickness. Pollen of the hybrids of the cross *fordii*×*cordata* was 50% fertile; that of the reciprocal cross (C×F) was completely sterile. The hybrid seedlings showed heterosis. The average height of the 1-year-old seedlings was as follows: F×C, 135 cm. (=the sum of the figures for the two parents); C×F, 81 cm.; F (selfed), 96·6 cm.; C (selfed), 43 cm. The ripening of the fruit of the hybrids of both combinations began at the beginning of November, of *cordata* at the beginning of October, of *fordii* at the beginning of December. The whole period from blossoming to fruiting was, on the average, about 2 months shorter in the hybrids than in *fordii*, and a month longer than in *cordata*. The structure of the flowers and inflorescences of the hybrids and most of their other characters were not intermediate but resembled closely those of one or the other parent. Preliminary observations suggest that hybrids of the first generation yield less oil than the parent forms, so that no improvement by such hybridization seems possible.

1670. LOUSTALOT, A. J., AND LAGASSE, F. S. 633.85-1.8
A comparison of winter and early spring applications of nitrogen to tung trees.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 51-8, bibl. 3.
Trials near Brooker, Fla, indicate that winter application of ammonium nitrate to tung trees allows absorption of the nitrogen to take place and translocation to the growing point ready for spring growth. It also needs labour at an easier time, and there is no evidence that it advances the date of blossoming.

1671. COLEMAN, R. 546.27: 633.85
Boron content of Mississippi soils and plants.
Reprint from *Better Crops with Plant Food Mag.*, 1945, pp. 4, bibl. 1.
The boron content in leaves of tung trees grown on Ruston sandy loam is noted as 48·5 p.p.m., the available boron content of the soil being 0·30 p.p.m.

1672. YOUNG, R. A. 633.854.5
Bamboos in American horticulture. *IV and V.
Nat. hort. Mag., 1946, **25**: 257-83, 352-65
In the fourth contribution of this series* bamboos of the clump or sympodial type from tropical and sub-tropical regions are considered with illustrations from Puerto Rico, the Panama Canal Zone and elsewhere. Many belong to *Bambusa multiplex*. In the fifth and concluding articles tropical bamboos of the following genera are considered: *Cephalostachyum*, *Dendrocalamus*, *Gigantochloa*, *Guadua*, and *Sinocalamus*.

* Parts I-III noted *H.A.*, 15: 1901 and 16: 1050.

1673. HODGSON, R. W., AND SCHROEDER, C. A. 634.451: 581.05
Effect of climate on fruit form in the kaki persimmon.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 71-3, bibl. 7.
Observations at the Citrus Experiment Station, Riverside Calif., and at Los Angeles, Calif., show that the length diameter ratio in the fruits of certain kaki varieties, notabl Hachiya, is greater in cooler and damper climates. Th varieties affected are characterized by pointed or rounde fruit apices. In most unaffected varieties the fruit apice are flat or depressed.

1674. ŠMARGON, E. N. 634.58: 581.162.3
On partial sterility in *Arachis hypogaea* L.
C.R. Acad. Sci. U.R.S.S., 1946, **54**: 739-41.
Partial sterility affects up to two-thirds of the flowers i groundnut and is caused by the failure of fertilization an the checked development of the gynophore from lack c suitable temperature, moisture and darkness. "Aerial gynophores already formed are able to develop fruit whe covered with moist soil. Such gynophores represent th early stage of "resting" fruits. Fruit-setting consists c two distinct stages: (1) fertilization and the development c the gynophore, and (2) formation of the fruit. Frui formation from the developed gynophores can occur onl in darkness and in the presence of moisture when th gynophore is immersed in the soil. Hilling is necessar for these processes.

1675. COLWELL, W. E., BRADY, N. C., AND REED, J. F. 634.58-1.8
Fertilizing peanuts in North Carolina.
Bull. N. C. agric. Exp. Stat. **356**, 1946, pp. 21, bibl. 6.
Field experiments with large-type peanuts, conducted i the Coastal Plain of North Carolina, showed that fo satisfactory fillings of the nuts soils with a low to mediu calcium content require applications of at least 400 l ground limestone (broadcast in February) or landplaste (applied to the foliage at early blooming stage). Dolomiti limestone applied in the row and magnesium carbonat proved less beneficial. Small-seeded varieties were foun to need a much lower supply of calcium. Althoug 60-100 lb. of potash per acre are removed by a good crop c peanuts, direct K applications are not recommende This nutrient should be given generously to the crops grow in rotation with peanuts. If peanuts are grown for severa years in succession, apply 100 lb. of muriate of potash pe acre on top of the row when the plants break through th ground. No response was obtained from phosphate c nitrogen applications.

1676. COINER, M. S. 634.651
Gifts of the Americas: papaya.
Agric. Amer., 1947, Vol. 7, No. 4-5, p. 3 of cover.
A note on the papaya, or papaw, its origin, uses, cultivatio and some varieties. There is a brief description of th preparation of papain, of which the U.S.A. importe 315,000 lb. in 1945, 75% of which came from British Ea Africa. It is stated that papayas, fresh or canned, ran high as a source of vitamins A and C.

1677. ADDISON, G. 634.651: 581.162
Sexo em mamão (*Carica papaya* L.). (Sex in papaw.)
Reprint from *Rev. Agric. S. Paulo*, 1943, **18**: 448-9.
The genetics of sex in papaw are briefly outlined. Crosse *Carica papaya*×*C. monoica*, a monoecious form fro Bolivia, yielded a few fruits but the hybrid seeds did nc develop embryos; in the reciprocal cross the fruits di not ripen.

1678. NEL, E. A. 634.651
Improvement of papaws.
Fmg S. Afr., 1947, **22**: 455-6.
An article for farmers explaining the need for plant selection. The technique of artificial pollination is briefly described.

1679. CALIFORNIA AVOCADO SOCIETY. 634.653
Check list of avocado varieties.
Yearb. Calif. Avocado Soc. for 1946, pp. 29-53.
A long list of varieties, briefly described, only 5 of which are recommended by the California Avocado Society for planting in southern California and none for all districts. The 5 varieties are: Anaheim, Fuerte, Hass, MacArthur and Nabal.

1680. GROSZMANN, H. M. 634.653
Avocado varieties.
Qd agric. J., 1947, **64**: 8-12.
The choice of varieties is all-important in Queensland, and standardization of varieties is the industry's greatest need. At present there are too many inferior seedlings which need to be grafted over to better varieties. An outline is given of desirable characters and the general principles to be followed in selecting better types. The two best varieties are thought to be Fuerte and Nabal. These both belong to Group B, and therefore require Group A pollinators.

1681. GRISWOLD, H. B. 634.653
Primitive avocados of Central America and Mexico.
Yearb. Calif. Avocado Soc. for 1946, pp. 103-5.
Some observations on wild avocados made during a trip through Mexico, Guatemala, El Salvador and Honduras in 1946.

1682. POPENOE, W., AND VILLEGAS, D. 634.653(86)
The future of the Aguacate in Colombia.
A review of the above which appeared in *Agricultura Tropical*, Colombia, Oct. 15, 1946.
Yearb. Calif. Avocado Soc. for 1946, pp. 107-8.
Points out the possibilities of the avocado in a country which seems naturally suited to it.

1683. HAAS, A. R. C. 634.653-1.84
Growth in avocado seedlings and the continuity of the nitrogen supply.
Yearb. Calif. Avocado Soc. for 1946, pp. 71-4.
The object of the experiment was to observe the effects on the growth of avocado seedlings of dividing a year's supply of nitrogen into a variable number of soil applications. In orchard practice such effects are often difficult to observe because of losses of nitrogen and other factors. The results appear to be somewhat analogous to those obtained with animals, namely, that continuity in growth is o considerable importance. [From author's summary.]

1684. HALMA, F. F., AND EGGERS, E. R. 634.653-1.542
Seasonal effect on the regeneration of avocado roots.
Yearb. Calif. Avocado Soc. for 1946, pp. 75-6.
Avocado roots, under coastal conditions, were found to regenerate new roots most rapidly when pruned between March and October. Pruning during other months caused no injury but merely delayed new growth. [Authors' summary.]

1685. BURGIS, D. S., AND WOLFE, H. S. 634.653: 581.43
Do avocado roots develop root-hairs ?
Yearb. Calif. Avocado Soc. for 1946, pp. 77-8.
In this study no root-hairs were found either under natural or artificial conditions of root growth.

1686. HODGSON, ROBERT W. 634.653-2.4
The College of Agriculture avocado tree decline research programme. A progress report.
Yearb. Calif. Avocado Soc. for 1946, pp. 57-61.
Discusses the current status of avocado decline, to which are added brief reports from the several scientific divisions working on the problem, and concludes with suggestions for future work and some facts and recommendations. Decline would appear to be associated with the soil fungus *Phytophthora cinnamomi*. Where trees have declined the planting of other tree fruits or crops is recommended.

1687. ZENTMYER, GEORGE A. 634.653-2.1/4
Diseases of the avocado.
Yearb. Calif. Avocado Soc. for 1946, pp. 79-83.
A description of a number of avocado diseases, their cause, prevention or control and an outline of future research plans.

1688. BOYCE, A. M. 634.653-2.6/7
Pests of the avocado.
Yearb. Calif. Avocado Soc. for 1946, pp. 84-5.
The principal pests are given as greenhouse thrips (*Heliothrips haemorrhoidalis*) and the avocado brown mite (*Paratetranychus coiti*). The former can be controlled by nicotine sprays, pyrethrum or DDT. In certain circumstances DDT has been found to penetrate the fruit, consequently its use for thrips control is not advised, except on an experimental basis. When DDT has been used on avocados the brown mite population has increased rapidly. Control of the brown mite is accomplished by use of sulphur dust.

1689.

a ANON. 634.653-1.541
Veneer grafts for avocados.
Yearb. Calif. Avocado Soc. for 1946, p. 88.
Successful cinchona type illustrated.

b BARRETT, C. 634.653
Planting and pruning avocado trees.
Yearb. Calif. Avocado Soc. for 1946, pp. 116-9.

c BEMBOWER, W. 634.653(96.9)
Avocado improvement program in Hawaii.
Yearb. Calif. Avocado Soc. for 1946, pp. 89-91.

d BRUNSON, M. H. 632.78
The oriental fruit moth on nursery stock.
J. econ. Ent., 1946, **39**: 797-800.

e COIT, J. E. 634.653-1.541.44
Methods of top-working the avocado.
Yearb. Calif. Avocado Soc. for 1946, p. 92.
An illustrated note.

f EBELING, W. 634.653-2.6/7
Minor insect pests of the avocado.
Yearb. Calif. Avocado Soc. for 1946, pp. 86-7.

g HASSAN, A., AND WAFA, M. H. A. 634.62: 581.162.3
An oestrogenic substance in pollen-grains of date palm tree *Phoenix dactylifera* L., *Palmae*.
Nature, 1947, **159**: 409-10, bibl. 5.

h HENRICI, M. 581.11(68)
Transpiration of South African plant associations. Part II. Indigenous and exotic trees under semi-arid conditions.
Sci. Bull. S. Afr. Dep. Agric. **248**, 1947 (?), pp. 41, bibl. 18, 3d.
For Part I see same series, No. 247, 1946.

i JACOBS, W. P. 634.58
The developmental morphology of the intercalary meristem in the gynophore of the peanut plant.
Abstr. *Amer. J. Bot.*, 1946, 33: 822.

j JEPPSON, L. R. 634.3-2.654.2
Di(4,chlorophenoxy) methane for control of citrus red mite.
J. econ. Ent., 1946, **39**: 813.

k KING, J. R. 634.64: 581.14
Development of ovule and megagametophyte in pomegranate.
Bot. Gaz., 1947, **108**: 394-8, bibl. 8.

l PRATT, H. K., AND YOUNG, R. E. 664.85.653.035.1
The identification of ethylene as a volatile product of ripening avocados.
Abstr. *Amer. J. Bot.*, 1946, **33**: 838.

m ROLLINS, R. C. 633.913
The occurrence of sublethal dwarfed hybrids in *Parthenium* and their chimeric mutation to normalcy.
Abstr. *Amer. J. Bot.*, 1946, **33**: 825.

n ROUNDS, M. B. 634.653
The Fuerte avocado.
Yearb. Calif. Avocado Soc. for 1946, pp. 54-6.

o SHEPHERD, J. S. 634.653: 658.5
Avocado marketing.
Yearb. Calif. Avocado Soc. for 1946, pp. 123-6.

p TURRELL, F. M. 634.3: 581.14
Estimating heights of citrus trees.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 147-50, bibl. 2.
By means of the hypsometer.

TROPICAL CROPS.

1690. BARNETT, H. L. 633/635(59.5)
A brief review of essential food-crop cultivation in Malaya.
Malay. agric. J., 1947, **30**: 13-18.
Figures are given showing the area under various crops in 1940 and 1945-46. The area under most food crops, including groundnuts, vegetables and bananas, was considerably greater in 1945 than in 1940. An additional note shows that 31 oil-palm estates, totalling about 69,000 acres, were in production at the end of 1946 compared with 46 estates, covering over 78,000 acres, in 1941.

1691. ANON. 633/635(943)
Investigations of horticultural and other problems.
Qd Agric. J., **64**: 131-2.
An editorial note on two new experiment stations of the Queensland Department of Agriculture, one at Nambour, mainly for pineapples, citrus, papaws, bananas, vegetables, ginger, etc., and another at Redland Bay mainly for investigating problems of vegetable production and plant introduction.

1692. SWINGLE, C. F., AND CRANDALL, B. S. 631.536
The hole planting system of the Upper Amazon Valley.
Agric. Amer., 1947, **7**: 90-2, 95.
In this system, of unknown origin, which is used for nearly all plants grown in this area, e.g. coca, cube, cinchona, tea, citrus, etc., holes from 12 to 20 inches deep are dug some time before planting and the young plants placed with the collar several inches below the top of the hole. Water and soil then slowly accumulate in the hole. Some problems arising out of the system are discussed.

1693. GOUDRIAAN, H. P. 631.875
Compost en de bereiding ervan. **(Compost and its preparation.)**
Landbouw, 1947, **19**: 323-7.
Details are given of co-operative composting of the waste materials of 10 native households; the process takes 3 months, and the product is said to be extraordinarily valuable.

1694. BRUNER, S. C., AND VALDÉS BARRY, F. 632.796
La bibijagua: consideraciones sobre su aspecto económico. **(The Cuban leaf-cutting ant and its economic aspects.)** [English summary 1 p.]
Circ. Minist. Agric. Dir. Estac. exp. Santiago de las Vegas, 1946, pp. 17.
The Cuban leaf-cutting ant does not normally cause appreciable damage to the most important crop plants of Cuba. It mainly attacks citrus, but only severely before the trees are 6 years old. Other plants which suffer damage from this ant are tobacco, cassava, yam, sweet pepper, peanut, pigeon pea, mango, okra, roses and some other ornamental plants. Its complete eradication in entire districts is practically impossible because of the reinfestation which would occur each year during at least 3 months by the young winged females, and because of the difficulty of recognizing the new colonies, particularly in uncultivated land. The control of the pest by destroying nests readily discernible is considered practicable.

1695. HARPER, S. H., POTTER, C., AND GILLHAM, E. M. 632.951: 634.41
***Annona* species as insecticides.**
Ann. appl. Biol., 1947, **34**: 104-12, bibl. 15.
The toxic principle in *Annona reticulata* and *A. squamosa* seeds and roots has been concentrated up to one hundredfold. The potency of this concentrate is roughly of the same order as that of rotenone to certain aphids, but it has neither the intensity of effect nor the range of insecticidal action of that compound.—Rothamsted.

1696. HANSBERRY, R. 632.951
Variations in the chemical composition and insecticidal properties of the yam bean (*Pachyrrhizus*).
J. agric. Res., 1947, **74**: 55-64, bibl 8
The relationship between origin, chemical analyses, and insecticidal value of 31 yam bean samples have been studied in tests with Mexican bean beetle larvae (*Epilachna varivestis* Mulo.). Significant correlations were found between toxicity and resin content, rotenone content, and three colorimetric analytical values. Neither the oil content nor six compounds other than rotenone isolated from the yam bean were significantly correlated with toxicity. The Meijer colour test is proposed as a suitable chemical method for indicating approximately the toxicity of yam bean samples. Most of the tests were made on samples of *Pachyrrhizus erosus* from various sources, but three other species, *P. tuberosus*, *P. strigosus* and *P. ahipa*, also were shown to be toxic to the larvae of the Mexican bean beetle.

1697. WILDEMAN, É., AND PYNAERT, L. 632.951
Notes sur des *Lonchocarpus*. **(Notes on certain *Lonchocarpus* species.)**
Bull. agric. Congo belge, 1946, **37**: 586-97, bibl. numerous in text.
Brief notes on the toxic and other properties of a large number of *Lonchocarpus* species taken from articles published in different parts of the world.

1698. EVANS, H. 632.951(698.2)
Results of some preliminary investigations on the control of weeds in Mauritius: Part VI—Some twining weeds.
Rev. agric. Maurice, 1947, **26**: 3-10.
Paederia foetida: doubt is expressed as to whether this weed can be eradicated economically with the herbicides now available. *Ipomoea cairica* was killed by one spraying of 0·1% Methoxone (M.C.P.A.) or Weedone (D.C.P.A.). *Asystasia gangetica* proved very susceptible to Methoxone. *Thunbergia fragrans* was completely eradicated by one application of 0·15% Methoxone. *Bignonia unguis-cati* was most effectively and economically destroyed by spraying with 10% sodium chlorate.

1699. VAN OVERBEEK, J., AND VELEZ, I. 632.954
Erradicación de malas yerbas en Puerto Rico con 2,4-D. **(Eradication of weeds in Puerto Rico with 2,4-D.)**
Bol. Inst. Agric. trop. Univ. Puerto Rico **1**, 1946, 37 pp.
A general introduction to weeds and their control is followed by a description of trials in sugarcane fields. An appendix is a list of over 80 plants that have been treated with 2,4-D, with brief notes of the results in each case.

1700. SWAMY, B. G. L. 633.821
On the life history of *Vanilla planifolia*.
Bot. Gaz., 1947, **108**: 449-56, bibl. 4.
Vanilla planifolia Andr., a native of Central America, is grown in South India as a horticultural plant. In this orchid the micropores do not remain united to form compound grains, massulae, or pollinia, but lie free inside the anther. The cytology of the sexual organs is described.

1701. GLOVER, J. 633.491(676)
Environment and the growth of the potato (*Solanum tuberosum*) in tropical East Africa.
Emp. J. Exp. Agric., 1947, **15**: 9-26, bibl. 14.
Potatoes, variety Kerr's Pink, grown at 600 and 3,000 ft. above sea level at 5° S. lat. in Tanganyika can give yields of ware similar to English yields provided that (*a*) the soils are manured on a scale comparable with that of moderate English practice, and (*b*) the plants receive enough water throughout life. Given these conditions the supposed depressing effect of short day-length and high temperatures is of no practical importance.

1702. CRAWFORD, D. M. 633.682
Gifts of the Americas: manioc.
Agric. Amer., 1947, Vol. 7, No. 2, p. 3 of cover.
An interesting note on the origin, characteristics, cultivation and uses of manioc, cassava or mandioca.

1703. COOPER, H. R. 633.72-1.416.1 +1.8
Nitrogen supply to tea.
Memor. Indian Tea Ass. **6** (revised 3rd edition), 1946, pp. 184.
The first edition of this pamphlet, published in 1939, was reviewed in *H.A.*, 9: 1019. This 3rd edition has been brought up to date as far as experimental yields are concerned, but tables of costs have been left as in the original edition.

1704. VAN DEN ABEELE, M. 633.72
La culture du théier. **(Tea cultivation.)**
Bull. agric. Congo belge (Bruxelles), 1942, **33**: 125-73, bibl. 32 [received 1947].
In this treatise on tea the author cites the following in order of importance as the chief sources of tea to-day: the valley of the Yangtse and S.E. China, N.E. India, Ceylon, Java, S. India, Sumatra and Formosa. Eighteen sources of minor importance are also named. The China tea plant is less susceptible to cold and drought. There are many hybrids. The author classifies teas into 4 groups, viz. (1) China group (or Bohea) with small leaves, found in China, Formosa and Japan. (2) Macrophylla, with large leaves, grown in Szechuan, Yunnan and Hu-jeh. (3) Shan, possibly related to the Assam group with large leaves. Found in Tonkin, Laos, Siam and Burma. (4) Assam, very large leaves, originating in India, the best known types being Manipuri and Burma. The author discusses with practical detail the temperature and soil conditions necessary for tea growing. Under cultivation practice he deals with choice of land and of seed; seed bed and nursery practice, planting out; shade plants and their use; pruning; plucking. He considers briefly, in general terms, the problem of selection and notes the practice of grafting, stating incidentally that layering (marcottage) has become a frequent practice in tea selection stations of Japan and Formosa. He roughly estimates the average production of dry tea per acre [figures actually given in kg. per ha.] at 1,100 lb. in the best plantations of Java, 329 lb. for the rest of Java, 951 lb. in Sumatra, 1,580 lb. in Japan, 400-800 lb. in Ceylon, 354-800 lb. in India and 1,000 lb. [in 1939] in Kenya.
Hitherto [in 1942] tea has only been grown on an experimental scale in the Congo, I.N.E.A.C. being in charge of the trials. Success depends on surmounting both climatic and economic difficulties and progress is being made, though up to the present Belgians have been little addicted to tea drinking, and, despite propaganda, habits change hard. Figures of world tea exports and imports are given for the years 1934-1938.

1705. ANON. 633.72-1.535
Tea selection. III.—The vegetative propagation of selected bushes.
Tea Quart., 1946, **18**: 91-4.
A guide to the method of propagation by cuttings advocated in Ceylon as a result of numerous trials.

1706. TUBBS, F. R. 633.72: 581.144.2
Taproots of lateral roots.
Tea Quart., 1946, **18**: 82-3.
The author states that the conception of the tap-root as an essential organ of the tea-bush dies hard. Its function can, and often is, taken over by laterals with no loss of efficiency. In considering drought-resistance it is the depth to which the root-system reaches rather than the presence, absence, or depth of the tap-root which matters. He concludes that if a clone is found to yield a larger quantity of better tea than the average bush on the estate, from a commercial point of view it would appear idle curiosity that demands to know whether the bush has a tap root, or, indeed, any roots at all. Photos illustrate the different root-systems.

1707. DICKSON, T. G. 633.72-1.874
Notes on the effect of *Drymaria* on an estate in Uva.
Tea Quart., 1946, **18**: 84-90.
An account of the spread of the creeping weed, *Drymaria cordata*, which first appeared in some experimental plots in 1936. It was then regarded as an acquisition and treated as a cover-crop in the inter-lines between tea bushes. The weed spread with extreme rapidity, reaching a climax in 1943, by which time it formed an unbroken cover over the whole estate. Since then the weed has lost vitality and has disappeared from some areas where it first appeared. The author concludes that *Drymaria* is expensive. It causes an initial loss of crop and from the short-term point of view it should be prevented from establishing itself on an estate at all costs. Taking the long view, it is impossible to say whether the gain in soil formed and erosion prevented by the weed will result in an eventual gain to the tea crop. Those in charge of estate policy must decide whether such a problematical gain is worth the price.

1708. TUBBS, F. R. 633.72-2.4
Blister blight.
Tea Quart., 1946, **18**: 90.
This disease has been known in N. India for almost 90 years but remained unknown in S. India and Ceylon until 1946. By December, 1946, it had spread to 68 estates between 1,500 and 5,000 ft. The disease, which is caused by a species of *Exobasidium*, probably *E. vexans*, is almost entirely confined to the younger leaves, occasionally spreading to the young stem. The first visible sign of its presence on a leaf is the formation of a slightly yellowish, translucent area, which later becomes shiny and depressed on the upper surface. It produces a blister on the lower surface of the leaf, approximately $\frac{1}{8}$ in.-$\frac{1}{2}$ in. across, which becomes white a few days later. In sunny weather these blisters rapidly become brown and dry. The disease is undoubtedly capable of causing serious damage, should it assume epidemic proportions.

1709. RAO, M. K. S. 633.72: 632.47
Blister-blight of tea in South India.
Pap. United Planters Ass. S. India **4**, 1946, pp. 22.
A brief history of blister-blight, *Exobasidium vexans*, in South India is followed by a description of the disease and the damage it causes. Recommendations are made for its control. There are 7 illustrations, and a map showing the distribution of the disease in S. India.

1710. THOMAS, A. S. 633.73
The cultivation and selection of Robusta coffee in Uganda.
Emp. J. exp. Agric., 1947, **15**: 65-81, bibl. 16.
Robusta coffee has been cultivated for hundreds of years near the N.W. corner of Lake Victoria. The old varieties having a spreading habit and small leaves are hardier than those of erect habit and large leaves. The former ripen earlier, and this character seems to explain their hardiness as they more easily recover from the strain of cropping. In experiments the erect bushes reached a peak of production when they were about 6 years old; but the yields of the spreading trees, trained but not pruned, are still increasing after 10 years. Robusta strains are very variable and appear to be heterozygous. The cultivation of Robusta coffee in Uganda is expanding rapidly, that country now being the largest producer of coffee in the Colonial Empire. More intensive study of the crop is needed.

1711. THOROLD, C. A. 633.73
A study of yields, preparation, out-turns and quality in Arabica coffee. Part I. Yields.
Emp. J. exp. Agric., 1947, **15**: 96-106, bibl. 9.
A description is given of the natural yields of Arabica coffee studied during an investigation of a disease problem. Individual tree yields are used to demonstrate the degree of variability. Mysore coffee trees with wide leaves gave higher yields than trees with narrow leaves. Biennial bearing is very prevalent and its intensity is expressed quantitatively as *I* values. The crop data are used to make suggestions in regard to plot experiments. [From author's summary.]

1712. CRANE, J. C. 633.73
Coffee is gold for El Salvador.
Agric. Amer., 1947, **7**: 69-72.
A description of the El Salvador industry which produces an acid coffee of pleasing aroma in demand for blending in the U.S.A.

1713. FOWLER, R. L., AND SALINAS, J. E. 633.74
Colombia's chocolate crop.
Agric. Amer., 1947, **7**: 27-30.
Colombia contributes only 2% of the world's cocoa, but greater production is now planned there. After discussing the best area for expansion the authors go on to deal with cultivation, harvesting, processing and plans for improving the industry. Colombia is one of the few countries in the western hemisphere where plantations of *criollo* cocoa may still be found.

1714. MINY, M. P. 633.74
La culture du cacaoyer au Congo belge. **(Cacao cultivation in the Belgian Congo and its future.)**
Bull. agric. Congo belge (Bruxelles), 1942, **33**: 385-444 [received 1947].
The main points of the author's conclusions on the future of cacao in the Congo are as follows: 1. Cacao production in the Congo is stationary. Average production per acre is too low: quality is ordinary. 2. Improvement will depend on (*a*) adopting good standard methods of cultivation, (*b*) proper choice of soil and use of shade, (*c*) control of *Sahlbergella* and *Helopeltis*, in which connexion the use of ants, e.g. *Crematogaster* sp., and of myzecophilous trees gives promise of success. 3. Selection and breeding for quality and quantity, the aim being to combine the quality of the Criollo with the vigour of the native species. Suitable basic collections have already been made by I.N.E.A.C. 4. Vegetative propagation will be of the utmost importance in selection of budwood. 5. Work is necessary on reciprocal rootstock : scion effects in cacao. The value of cuttings is proved, but so far is limited to the provision of clones to act as rootstocks. 6. The work envisaged is all long-term research, and quick results cannot be expected.

1715. DE BELLEFROID, V. 633.74(675)
La culture du cacaoyer au Congo belge. Étude sur les travaux d'enrichissement du soil à Lukolela. **(Cacao cultivation in the Belgian Congo. Manurial trials at Lukolela.)**
Bull. agric. Congo belge, 1946, **37**: 554-85.
The period of this trial, 1940-1945, was marked by the very severe drought of 1942 which played havoc with cacao and resulted in many deaths and in a 50% drop in yield. The many manurial treatments, results of which are tabulated, included the use of different composts, mineral fertilizers, undecomposed weeds—very bad results—green manures, etc. Results were extremely discouraging probably owing to the fact that the cacao is growing under essentially unfavourable drought conditions without any possibility of irrigation. Under such conditions no treatment proved really efficacious or remunerative. The remedy would appear to lie in very extensive methods of planting, in planting drought-resistant types, severe cutting back of drought-affected trees, and the proper use of shade trees. *Erythrina* proves ineffective in the Congo; *Terminalia superba*, despite its large root system, seems to be useful: it would appear to lose its leaves in a season of drought before *Erythrina*. *Pyptadenia africana* and *Inga saman* both proved positively harmful.

1716. HUMPHRIES, E. C. 633.74-2.19
Wilt of cacao fruits (*Theobroma cacao*). IV. Seasonal variation in the carbohydrate reserves of the bark and wood of the cacao tree.*
Ann. Bot. Lond., 1947, **11**: 219-44, bibl. 11.
Earlier investigations indicated that wilt of cacao fruits is due to nutrient and water deficiency. Seasonal changes in (1) water content, (2) alcohol-soluble material, (3) non-carbohydrate alcohol-soluble material, (4) sucrose, (5) total reducing sugars, and (6) starch in the bark and wood of cacao trees at various levels, and seasonal changes in crop were followed. Variations due to seasons and levels were significant for all constituents. Maxima in (2), (4), (5) and (6) occur before vegetative flushing, which makes a greater demand than the developing crop on the reserves of the tree. Some factor other than carbohydrate limits the crop.

1717. GREENWOOD, M., AND POSNETTE, A. F. 633.74-2.19
A morphological change induced in leaves of *Theobroma cacao* by mineral deficiency.
Nature, 1947, **159**: 542-4, bibl. 5.
The leaves of cacao seedlings, which grew in pots and showed severe symptoms of lime-induced chlorosis, were observed to develop a number of sharp dentations at the tip. Thereafter, seedlings were grown in water cultures lacking iron *and* manganese. These plants produced deeply indentate leaves, while other seedlings raised in water cultures lacking only one of these substances formed normal, entire leaves. This is believed to be the first record of the influence of mineral supply on leaf shape. The significance of the observation for the identification of species is pointed out. Photographs show the normal and indentate cacao leaf.—West African Cacao Research Institute, Tafo, Gold Coast.

1718. POSNETTE, A. F. 633.74-2.8
Use of seeds in the insect transmission of some plant viruses.
Nature, 1947, **159**: 500-1.
An improved technique of swollen shoot virus transmission

* Parts I and II, *Ann. Bot. Lond.*, 1943, 7: 31-44 and 45-61; *H.A.*, 13: 599. Part III, *ibid.*, 1944, 8: 57-70; *H.A.*, 14: 1348.

in cacao by insect vectors is described, which—among many other advantages—shortens the period between infection and development of symptoms. After having fed on an infected plant the insect is transferred to a cacao bean, the testa and one cotyledon of which were removed to expose the convoluted surface of the other. The bean is placed in a solid or " block " watch glass, kept moist with filter paper, and the insects are killed with nicotine solution after the required feeding time. The beans are then planted in sterilized sand in an insect-proof house; germination is not affected. Symptoms are usually visible in the leaves about 3 weeks after inoculation. The method, which can be modified for testing suspected vectors found in natural outbreaks of virus diseases far distant from the laboratory, might be applicable to other plants with exalbuminous seeds.—West African Cacao Research Institute, Tafo, Gold Coast.

1719. Baker, R. E. D., and Dale, W. T. 633.74-2.8
Notes on a virus disease of cacao.
Ann. appl. Biol., 1947, **34**: 60-5, bibl. 4.

The symptoms of this disease are vein-clearing or mosaic of leaves and red-mottle of the leaves and pods. Although the rate of spread in the field has varied somewhat, a mean increase of 41% over the original number of infected trees has been found over a 10-month period. There are two strains, both readily transmitted by budding. No insect vector has been found.—Imp. Coll. Trop. Agric. Trinidad.

1720. Crowdy, S. H. 633.74-2.4
Observations on the pathogenicity of *Calonectria rigidiuscula* (Berk. & Br.) Sacc. on *Theobroma cacao* L.
Ann. appl. Biol., 1947, **34**: 45-59, bibl. 20.

Calonectria rigidiuscula, found associated with acute and chronic dieback of cacao, may also infect cankers caused primarily by *Phytophthora palmivora*, and the lesions following attack by the capsids *Sahlbergella singularis* and *Distantiella theobroma*. The association with the capsid lesions is of great economic importance, since it appears that capsids alone are capable of killing only green shoots, and that the severe damage caused to woody shoots follows *C. rigidiuscula* infection of the capsid lesions.—W. African Cacao Res. Inst.

1721. Dale, W. T. 633.74-2.4
Witches' broom disease investigations. XII. Further studies on the infection of cacao pods by *Marasmius perniciosus* Stahel.
Trop. Agriculture, Trin., 1946, **23**: 217-21, bibl. 7.

Trials at Trinidad show that there is little difference in the behaviour of the fungus under Suriname and Trinidad conditions with regard to pod infection. Descriptions are given of various manifestations of pod infection. Results of the inoculations are shown in tabular form. There was indication of increased resistance in both Maranhao and I.C.S.I. cacao varieties after pods had reached a length of about 7 cm. The average period of time elapsing between initial infection and the appearance of necrotic symptoms in the large types of witches' broom pod was 80-90 days. Infection tended to produce premature ripening, especially in the severely damaged pods.

1722. Farnworth, C. H. 633.77
Gifts of the Americas: yerba mate.
Agric. Amer., 1947, Vol. 7, No. 3, p. 3 of cover.

A short note on the origin, uses and preparation of the beverage yerba mate, prepared from the leaves of *Ilex paraguariensis*. It is produced commercially in Brazil, Argentine and Paraguay, their combined production in 1943 being 373 million lb. The annual consumption in Argentina alone usually averages 243 million lb.

1723. Whitaker, C. H. 633.834
Nutmegs from Grenada.
Agric. Amer., 1947, 7: 50-3.

A popular, illustrated article on the origin, characteristics and requirements of this crop (*Myristica fragrans*), with a brief description of the industry in Grenada. Short sections are devoted to diseases, pests, production, harvesting, drying, curing and marketing.

1724. Islip, H. T. 633.841
Black pepper from Sierra Leone.
Bull. imp. Inst., 1946, **44**: 275-9.

The samples analysed showed unusual constants. Such pepper, in normal times, might suffer in competition with pepper of recognized composition. It is suggested that steps might be taken to overcome these undesirable analytical features, if possible, by improving present growth and importing new plant material.

1725. Adriaens, L. 633.85(675)
Les oléagineux du Congo belge. **(Oil seed plants of the Belgian Congo.)**
Bull. agric. Congo belge (Bruxelles), 1943, **34**: 3-110, 397-535 [received 1947].

In these two articles details are given of the cultivation, native name, chemical composition and commercial use of the seeds or fruits of the chief vegetable oil seed plants grown in the Belgian Congo. They belong to 3 monocotyledonous orders, namely *Gramineae*, *Cyperaceae*, and *Palmae*, and to some 34 dicotyledonous orders. They are usefully indexed under their botanical names.

1726. Greenway, P. J. 633.863
Yeheb.
E. Afr. agric. J., 1947, **12**: 216-9, bibl. 9.

An interesting account is given of a useful desert shrub, *Cordeauxia edulis*, which yields edible seeds and a magenta dye. It is found in parts of Somaliland and Ethiopia where the rainfall may be no more than 5 in. – 8 in. per annum. According to one authority on Somaliland (1907) the seeds formed the staple diet of the poorer natives in the Haud, the waterless desert of southern Somaliland. Its fruit is a leathery pod containing one, but sometimes two, seeds. An analysis of the seeds gave approximately 24% sugars, 37% carbohydrates (not sugar), 13% proteins, 11% fat, 3% ash and 9% moisture. Attempts to grow Yeheb outside its natural habitat have not succeeded. Seeds have been sent to Kew, S. Africa, Jamaica and the U.S.A.

1727. Thomas, A. S. 633.88.51(676.1)
Cinchona in Uganda.
Emp. J. exp. Agric., 1946, **14**: 75-84, bibl. 4.

The cultivation of cinchona in Uganda is described under the following headings: (1) historical, (2) selection, (3) climatic and soil requirements, (4) cultivation, (5) pests and diseases, (6) costs, yields and returns. The production of quinine by a cinchona tree depends not only on the richness of the bark but also on the thickness of the bark and the growth of the tree. To estimate the relative value of trees the figure used has been the product-percentage of quinine sulphate × girth of tree × weight of sample. Most of the trees sampled were vigorous; many had more than one stem; of those which had a single stem few had a girth of less than 50 cm. at a height of 1 metre above ground-level; the largest tree with a single stem had a girth of 76 cm. As seedlings of *Cinchona josephiana* grow so well in Uganda there is no question of using the more expensive grafted plants for commercial quinine production. Seed has been collected from many of the best trees and their progenies are being planted out for observation. Preliminary trials of side-grafting indicate that the clones differ greatly in the ease with which they may be propagated in this way. Cinchona has been found to grow well on the heavy red earths so common in Uganda; if these red earths are too much cultivated when wet their physical condition is bad, but if cinchona is planted on them soon after the land has been cleared from elephant grass and the structure is good the crop grows well. It is essential that nursery beds should be arranged so that seeds are exposed to light but are

protected from rain; if the soil is too wet, the seedlings will become attacked by *Rhizoctonia* and will die off. Crickets are a nuisance in nursery beds. The mosquito bug, *Helopeltis* [*orophila*], attacks seedlings during dry spells, but it can be controlled by dusting with pyrethrum powder. Large grasshoppers sometimes do much damage. Cinchona is very liable to death from root rot caused by *Armillaria mellea*; land under elephant grass, where the fungus is rare, is recommended for cinchona in preference to forest soils where the fungus is often abundant.

1728. FERNIE, L. M. 633.88.51-1.535
The vegetative propagation of *Cinchona* by cuttings.
E. Afr. agric. J., 1947, **12**: 228-36, bibl. 18.
The advantages of vegetative propagation are discussed and its history outlined. Propagation from softwood stem-cuttings is advocated. Root- leaf-, axillary-, and hardwood-cuttings were also tried. *C. succirubra* roots easily, and thin cuttings of current year's growth, from sucker stems, are recommended. Glazed propagation frames are considered necessary to ensure efficient and uninterrupted propagation, under control. Bottom heat appears unnecessary. Shallow planting is advocated. The time taken to root cuttings varied from 2 to 6 months. Rooted cuttings were transplanted direct to shaded nursery beds and remained there until ready for planting in the field.

1729. CARAYON, J. 633.88.51-2.754
Les *Bryocorinae* (*Hémipt. Miridae*) nuisibles aux quinquinas en A.O.F. **(The hemipterous pests of *Cinchona* in French West Africa.)**
C.R. Acad. Agric. Fr., 1947, **33**: 34-7.
Five hemipterous pests of *Cinchona ledgeriana* are described, viz. *Helopeltis bergrothi* Reuter, *H. westwoodi* White, *H. orophila* Ghesquière, *Lycidocoris mimeticus* Reuter & Poppins, *Pentilioforma impressopunctata* Schumacher. It seems certain that these species have invaded the plantations at various times from the neighbouring forests.

1730. ANON. 631.556.8: 633.912
Tapping systems for young rubber.
Advis. Circ. Rubb. Res. Sch. Ceylon **17**, revised 1947, pp. 7.
Recommendations are made based on existing conditions. The choice of a tapping system is discussed and four of them, including the Double-Four, are described. There is a final note on pre-coagulation and its prevention.

1731. ANON. 633.912: 631.538
Poisoning of rubber trees with sodium arsenite before replanting.
Circ. Rubb. Res. Inst. Malaya **23**, 1947, pp. 2.
In healthy rubber stands, poisoning of the trees prior to replanting is cheaper than felling and stumping. Where root disease (*Fomes lignosus*) is prevalent, the poisoned stumps remain a source of infection and complicate root treatment. Large trees are killed by pouring into a girdle " frill " (operation described) ½ pint of a solution, made by dissolving 10 lb. of sodium arsenite in 1 gallon of hot water. For smaller trees the concentration of the solution may be halved. Branch fall usually begins about 6 months after poisoning, and the tree trunks fall to the ground about 1½-2 years after treatment. The best results have been obtained on warm sunny days when the upward flow of sap is greatest. Poisoning should not be carried out during or immediately before wintering.

1732. HAINES, W. B. 633.912-1.8
Manuring hevea. IV. Conspectus of experimental improvements achieved in mature stands at the end of ten years, with a special note on seed production.
Emp. J. exp. Agric., 1946, **14**: 182-6.
The author records further results of manurial experiments with hevea (see *H.A.*, 10: 1487). Drawings show the difference in shape and size of manured and unmanured 18-year-old trees. The unmanured trees have retained the so-called " orchard " shape because the poor foliage has let in enough light to maintain activity in the lower and interior branches. Walking is obstructed on these plots. The manured trees carry a dense foliage on branches high overhead. There are also differences in bark renewal and sappiness, which form the chief basis for the final effects on yield. When manuring is started the first effect is an improvement of the foliage of the lowest branches; this soon spreads to the upper parts of the trees, followed by a shading out of the lower and interior branches. Nitrogen has quite outstanding importance and, although the addition of phosphate improves girthing, none of the additions to nitrogen have provided practical yield increases. In these experiments, although the foliage improvements were general and rapid, the yield increases were immediate only in the case of the younger stands on very depleted (previously cultivated) sites. Phosphate has proved to be generally essential to the early growth of young rubber in Malaya, but in the later, mature phases it must be used with discretion or the trees may be stimulated in directions which have no significance for ordinary estate production, yet take their toll in the nitrogen economy of the trees.

1733. JACKSON, T. H. 634.1/8(67.62)
The home orchard [in the Kenya Highlands].
E. Afr. agric. J., 1947, **12**: 153-66, bibl. 11.
Deciduous fruits were unknown in the East African Highlands before the coming of European settlers, and knowledge of their requirements is still very incomplete. Although the climate of these equatorial highlands is temperate, it differs markedly from that of Europe, e.g. (1) there is no clearly defined summer and winter, (2) the diurnal range of temperature is great and (3) the long dry-season coincides with the period when the fruit is maturing. Some unfortunate consequences of these differences in climate are described and methods for overcoming them suggested. The author states that it is now possible to make certain recommendations for those who wish to plant small orchards and gives useful general advice on the kinds and varieties of fruit to plant at elevations of 4,000 to 9,000 ft. He then proceeds to deal with orchard management, including the choice of rootstocks, and the treatment of diseases and pests. A final section is devoted to the grape-vine.

1734. BULMAN, E. 634.413
Gifts of the Americas: the cherimoya.
Agric. Amer., 1947, Vol. 7, No. 6-7, p. 3 of cover.
An informative page on the etymology, origin, habits and requirements of this favourite sub-tropical fruit (*Annona cherimola*), with notes on its two well-known relations, the sugar-apple (*A. squamosa*) and the soursop (*A. muricata*).

1735. MARLOTH, R. H. 634.441
The mango in South Africa. Part I. Soil and climatic requirements, and varieties.
Fmg S. Afr., 1947, **22**: 457-63.
An informative, illustrated article which opens with notes on the importance of the mango, its origin and requirements. A description of the mango-growing areas in the Union follows. The author then deals briefly with flower-formation, fruit-bud initiation and biennial bearing and quotes the results of Indian studies. Wide divergence of opinion exists as to the agency responsible for pollination. The formation of the flower provides for pollination by insects. Self-pollination has been observed to a limited degree in some varieties. Certain varieties exhibit the " small fruit " phenomenon, which it is suggested is a physiological response to climate at the time of fruit-setting. Research has so far failed to explain the failure of several varieties to bear normally and regularly in S. Africa. There is a section on varieties and a description of the ideal mango.

1736. ANON. 634.441: 581.162.3
Por qué no dan fruto los mangos ? **(Why does the mango fruit grow so poorly ?)**
Rev. agric. Guatemala, 1946, **1**, Nos. 15-20, pp. 38-43.

The cause of low cropping in the mango is not yet fully understood. One of the associated factors is a fungus, *Colletotrichum gloeosporioides*, which develops rapidly in wet weather, and this is probably one reason why the mango fruits set best during dry weather. The structure of the flowers is such as to suggest that pollination is effected by insects, and many insects are known to visit them. Some varieties flower during humid weather, others do not flower until some time after the rains have ceased. Sometimes a tree is almost covered with flowers; at other times one side only bears flowers. Certain varieties that produce good crops are characterized by a high percentage of perfect flowers. Other varieties that fruit regularly but with rather low crops have fewer perfect flowers. Cross-pollination helps setting fruit.

1737. BRIEGER, F. G., AND GURGEL, J. T. A. 634.441: 581.169
Poliembrionia em mangueira. **(Polyembryony in mango.)**
Bragantia, 1942, **2**: 481-98.

In spite of the size of seeds and embryos it was found impossible to determine the number of embryos in the seeds, for the cotyledons were so twisted around each other that they could not be separated. It was necessary to take into account only the embryos which germinated after 3 to 7 months. Plates show germinated polyembryonic seeds.

1738. HUME, E. P., AND COBIN, M. 634.471: 581.142
Relation of seed size to germination and early growth of mangosteen.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 298-302, bibl. 2.

Seed germination in the mangosteen resembles that in an orchid except that in the mangosteen it is asexual and develops from the inner integument. In trials at Mayaguez, P.R., percentage germination was found to increase with each 0·1 g. increase in seed weight from 0·2 to 1 g., above which increased weight had little effect. The number of seedlings surviving and their growth increased with seed weight to a maximum of about 1·3 g. Mortality of seedlings was greater in seedlings transplanted at the 4-leaf and 6-leaf stages than at the 2-leaf stage. The growth peculiarities of the mangosteen are described and discussed in relation to the results obtained.

1739. HILL, A. G. 634.58(676)
Oil plants in East Africa. (1) Groundnuts.
E. Afr. agric. J., 1947, **12**: 3: 140-6, bibl. 39.

This article should be of value to those interested in the new large-scale projects for increasing groundnut production in Africa. The origin of the groundnut (*Arachis hypogaea*) and its growing importance to man is discussed. Types and varieties are described and the chemical analysis of two common varieties is given. Succeeding sections deal with soils, manures, cultivation, harvesting, shelling, diseases, pests and the economics of production. It is concluded that with the expanding world demand for edible oils and proteins it is highly probable that the groundnut will play an increasingly important part in East African agriculture.

1740. HILL, A. G. 634.6
A note on *Allanblackia stuhlmannii* Engl.
E. Afr. agric. J., 1947, **12**: 210-11, bibl. 4.

Interest has been periodically shown in this East African tree as a source of edible fat. A botanical description of the tree, which belongs to the *Guttiferae*, is given together with a brief account of a simple process for extracting its fat which amounts to approximately 30% of the sun-dried nuts or seeds. The physical constants of the fat are tabulated and compared with those of *A. floribunda* from West Africa. It is doubtful whether it would be profitable to establish plantations of *Allanblackia stuhlmannii*, but it should be possible to obtain considerable quantities of nuts from wild trees in the Usambara forests of Tanganyika.

1741. CHILD, R. 634.61: 631.16
Costs of production of coconuts and copra in Ceylon.
Reprinted from *Ceylon econ. J.* by Coconut Res. Sch., Ceylon, 1947, pp. 15.

An address to the Ceylon Economic Society, 15 November, 1946. The variations in cost of production since 1918 are given and the costs in 1936 and 1945 analysed with special reference to labour and manuring. Ceylon costs are compared with those of Malaya and a comparison made between copra costs and those for other oils and fats on the world's markets.

1742. FARRINGER, D. E. 634.771
Bananas of the American tropics.
Agric. Amer., 1947, **7**: 63-4, 76.

After describing the numerous uses of the banana the author describes the following varieties: Gros Michel (illus.), Claret, Lady Finger, Apple, Cavendish (illus.) and Plantain. He concludes with a note on the outlook for the banana industry and suggests that air transport may be instrumental in introducing some of the more delicate and perishable exotic varieties to N. American consumers.

1743. GADDINI, L., AND CIFERRI, R. 634.771(677.3)
Il banano nell'oasi di Derna. **(The banana in the oasis of Derna [Cyrenaica].)**
Relaz. Monograf. agrar-colon. **59**, 1940, pp. 34, bibl. 24 [received 1947].

A description of the characters of the two banana varieties grown on a small scale in the oasis. These are (1) a type of *Musa paradisiaca sapientum* known locally as Mauz Derna, and (2) the Lacatan or banana of Alexandria type of *Musa nana* known as Mauz es-Sandria. The symptoms of a bacterial disease, probably *Bacterium solanacearum*, which attacks both varieties are also discussed. No satisfactory control is as yet known.

1744. SIMMONDS, N. W. 634.771 + 633.491
The relative yields of bananas and potatoes.
Trop. Agriculture Trin., 1946, **23**: 226-8, bibl. 15.

Comparison of yield figures for potatoes in the U.S.A. and Britain and for bananas in Central America and the Canary Islands shows that there is really little difference in the amounts of food yielded per acre per year by bananas and potatoes under their respective agricultural conditions.

1745. SIERRA, H. M. 634.771
Explotación bananera modelo Tiquisate. **(The model banana estate at Tiquisata.)**
Rev. agric. Guatemala, 1946, Vol. **1**, Nos. 15-20, pp. 50-7.

The author describes the plantations of the United Fruit Co. at Tiquisata, Guatemala, which are said to be the most modern and largest (125,000 hectares) banana estate in the world. The article is followed by data and illustrations of the losses suffered by the company from severe hurricanes in recent years.

1746. FENNELL, J. 634.8: 551.566.1
La uva tropical. **(Tropical grape-vines.)**
Rev. agric. Guatemala, 1946, Vol. **1**, Nos. 15-20, pp. 25-37.

The author, discussing the culture of the grape-vine in the tropics, describes a number of hybrid varieties, raised in Costa Rica, that are under trial for cultivation in those regions.

1747. COOKE, F. C. 635.1/7: 631.875
Intensive gardening in a P.O.W. camp.
Malay. agric. J., 1947, **30**: 19-26.

An account is given of the food deficiencies in a P.O.W.

camp in Malaya and of the steps taken by the prisoners to overcome them. An infertile soil was made to produce high yields of green vegetables by the application of compost made from kitchen waste. Such compost can be produced in 45 days in the tropics at a cost of 40 man-hours per ton. The compost heaps were covered with a thick jacket of lalang (*Imperata arundinacea*) which not only assisted decomposition in the heaps but also prevented the breeding of flies.

1748. LOWE, B. A. 635.1/7(67.62)
Vegetable production at Cameron Highlands.
Malay. agric. J., 1947, **30**: 5-12.
A review is given of the production of temperate-climate vegetables in the Cameron Highlands, Malaya, at 3,000-5,000 feet. The methods used, introduced by gardeners from south China, are criticized. The results from a series of controlled observation plots treated with varying quantities of compost and fertilizers are summarized and the suggestion made that the traditional Chinese methods for maintaining soil fertility are uneconomic in the Cameron Highlands, and further that it would be profitable for growers in the district to devote the major portion of their holdings to growing vegetable matter for compost or green manure. The change is advocated on economic grounds in view of probable future competition from imported vegetables.

1749. MILLER, C. D., ROSS, W., AND LOUIS, L. 635.1/7(969): 581.192
Hawaiian-grown vegetables. Proximate composition; calcium, phosphorus, total iron, available iron, and oxalate content.
Tech. Bull. Hawaii agric. Exp. Stat. **5**, 1947, pp. 45, bibl. 63.
The proximate composition of 40 Hawaiian-grown vegetables of 32 species was found to differ little from that of vegetables grown elsewhere, with the exception of iron content, which was somewhat lower in the Hawaiian samples.

1750. SWYNNERTON, R. J. M. 635.25(67.829)
Onion cultivation on Kilimanjaro [Tanganyika].
E. Afr. agric. J., 1947, **12**: 176-9, bibl. 3.
The area under this native-grown crop has expanded greatly in recent years. The variety grown is Bombay Red [a short-day type] which is raised from Indian seed, supplemented by locally-grown supplies. This variety is hardy, a good yielder and keeps well for 6 to 8 months. It has a comparatively thick skin and handles well. Its main fault is its susceptibility to thrips attack. The average yield of onions in the Moshi district in 1945 was approximately 7 tons per acre. In 1946 yields were halved by drought and thrips. Directions are given for: laying down nurseries; transplanting; spacing; manuring; controlling thrips; storing and grading. The importance of improving yields and quality to meet anticipated competition from imported onions is stressed.

1751. CHILDERS, N. F., AND ROBLES, P. S. 635.52
Slobolt lettuce for the tropics.
Agric. Amer., 1947, **7**: 93-5.
A new, non-heading variety which will not bolt in warm climates; a great contribution to tropical agriculture.

1752. CACAVELOS, M. M. F. 635.627
Las esponjas vegetales o " paxte ". **(Vegetable sponges.)**
Rev. agric. Guatemala, 1946, Vol. **1**, Nos. 15-20, pp. 85-7.
An account of the properties, uses and industrial applications of loofah, the skeletonized fruit of *Luffa cylindrica*.

1753. PORTÈRES, R. 635.655(665.2)
Observations sur les possibilités de culture du soja en Guinée forestière. **(Observations on the possibilities of cultivating the soybean in French Guinea.)**
Bull. agron. Minist. France d'Outre Mer **1**, 1946, pp. 82.
The forest and subforest regions of French Guinea were found to lend themselves well to the cultivation of the soybean by Africans.

1754.

a ADAMSON, A. M. 632.732
Termites in Trinidad and Tobago, B.W.I.
Trop. Agriculture Trin., 1946, **23**: 221-3.

b LOUSTALOT, A. J. 633.88.51: 581.192
A semi-quantitative quick-test for determining quinine in cinchona bark.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 386-90, bibl. 4.

c THIRUMALACHAR, M. J., AND NARASIMHAN, M. J. 633.73-2.4
Studies on the morphology and parasitism of *Hemileia* species on *Rubiaceae* in Mysore.
Ann. Bot. Lond., 1947, **11**: 77-89, bibl. 31.

PACKING AND STORAGE*

1755. WILLIAMS, C. G. 631.564: 634.1/8 + 635.1/7
Sizes and specifications of fruit and vegetable cases.
Qd agric. J., 1947, **64**: 212-6.
Details are given of the various types of cases, their measurements, capacity and uses. Some illustrated notes on construction are appended.

1756. EHMKE, H. F. 634.31: 632.77/78
Hot water immersion of oranges to detect minute stings.
Fmg S. Afr., 1946, **21**: 838-42, 848.
Much decay develops during transport in oranges, which are in an apparently sound condition when packed. Usually, these losses are ascribed to various physiological factors, but the author believes they are largely due to minute stings by both false codling moth and fruit fly, which cannot be detected with the naked eye at the time of packing. The remedy suggested is based on the principle that from oranges floating in a hot water bath the heated air escapes in bubbles through any splits or insect punctures in the rind, in much the same manner as from a punctured inner tube. A description is given of such a bath installed by a large citrus estate, where the new method is being practised with great success. At the end of the bath, where the fruit plunges into the water after leaving the bleaching bath by means of a slatted conveyor, there is a paddle which, turning very slowly, keeps the fruit moving forward until it is extracted by means of another slatted conveyor and taken through the drying tunnel on to the sorting belt. The distance from the paddle to the point at which the fruit is lifted out of the water is about four and a half feet and it is during the time the fruit takes to float this distance that the bubbling effect is observed. The temperature of the water is maintained by steam injection, which is also employed for heating the coils in the drying tunnel. The optimum water temperature, which caused the fruit to bubble about half way along the line of flow, was found to be 45° C. With a period of immersion of about 3 minutes no scalding occurred. With an elevator speed adjusted to the speed of the belts on the sorting table the fruits float about three deep, a convenient concentration for tracing any bubbles to their source. When the fruit had undergone a 3- or 4-day wilt before testing, there was a distinct loss of efficiency in the incidence of bubbling. In another South African packing

*See also 1432–1434.

house the hot water bath culling method has proved equally successful. Some figures are given for the percentage of culled fruits on both estates.

1757. Borgström, G., and Castberg, C. 664.85.11
SPF:s lagringstävlingar met äpplen. (Apple storage competition of the Swedish Pomological Society.)
Sver. pomol. Fören. Årsskr., 1946, **47**: 185-258.

For a short description of the ambitious apple storage competition scheme, initiated by the Swedish Pomological Society, see *H.A.*, 15: 1301; and for a discussion of the first results obtained, see *H.A.*, 16: 2246. The authors, who are conducting the investigation, are members of staff of the Institut för växtförskning och kyllagring (I.V.K.), Nynäshamn. The varieties included Cox's Orange, Cox's Pomona, Filippa, Gravenstein, Ribston, Wealthy, Laxton's Superb, and Åkerö, each of which formed a class by itself. There was also a so-called free class, where other varieties could be entered, some of which, in the opinion of growers, surpass the keeping quality of the first-named group. The results are recorded in an extremely detailed manner in 55 pages of diagrams and tables, and only a few of the observations and conclusions can be mentioned here. It was found that Cox's Orange is less liable to physiological breakdown than to fungus diseases, particularly to *Gloeosporium* rot. This is noteworthy, since in England and Denmark this variety is susceptible to cold injury in cold storage. Possibly, the Swedish climate increases resistance to such injury. On the other hand it was more severely attacked by *Gloeosporium* than was any other variety, but it is suggested that better control measures might help to remedy that. Ribston suffered badly from scald, probably because this variety does not reach full maturity in Sweden. On the whole, *Gloeosporium* rot and storage scab proved to be the two diseases most detrimental to apple storage in Sweden. Blue mould never occurred in the absence of external injuries. It is hoped to make a study of the relation between degree of maturity at picking and incidence of such physiological diseases as scald and lenticel spotting. Full data are presented of the changes in sugar and acid content during storage and of the analyses made of the soils on which the apples under examination had grown. Another set of data relates to the economic aspect of apple storage.

1758. Esselen, W. B., Lawler, K. M., and Fellers, C. R. 664.8.037
Home freezing in Massachusetts.
Bull. Mass. agric. Exp. Stat. **437**, 1946, pp. 27, bibl. 23.

Information of costs of rented lockers and home freezers; recipes for preparation and packing of fruit and vegetables; and suitability of U.S. varieties for freezing.

1759. Smith, W. H. 664.85.22: 632.111
Control of low-temperature injury in the Victoria plum.
Nature, 1947, **159**: 541-2, bibl. 5.

Following a discussion of different theories on the nature of low-temperature injury in storage the author reports on his own experiments carried out at the Ditton Laboratory, East Malling, Kent. He found that the life of Victoria plums kept at 31° F. may be extended to about 40 days, if for 2 days between the 15th and 20th day of storage the fruit is warmed to 65° F. It is suggested that the interruption of cold storage may prove useful also in other types of fruit.

1760. Pienazek, S. A., Christopher, E. P., and McElroy, L. A. 664.85.11.035.1
Further data on the control of storage scald of apples by means of carbon dioxide.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 81-8, bibl. 8.

In trials at Kingston, R. Island, storage scald of apples was successfully controlled by exposure of freshly picked fruit to a 5-day treatment with 50% CO_2. Some injury was observed with certain varieties, i.e. Baldwin and McIntosh. Encouraging results were got with Bartlett pears. Further work is necessary before definite recommendations can be made.

1761. Biale, J. B. 664.853.035.1
Critical oxygen concentrations for the carbon dioxide evolution by citrus fruits.
Abstr. *Amer. J. Bot.*, 1946, **33**: 834.

Lemons and oranges were subjected to modified atmospheres varying in oxygen content from 0 to 100% at a constant temperature of 15° C. There appeared to be a range rather than a single value for the critical oxygen tension. The occurrence of the climacteric was particularly noticeable under oxygen conditions higher than in air. The changes in oxygen tension brought about differential rates of chlorophyll destruction in green fruit. Lemons subjected to air became fully yellow in 4 to 6 weeks, while those under 5% O_2 or less had much green pigment in the peel even after 6 months. The storage life was markedly prolonged by sub-atmospheric oxygen conditions.—University of California.

1762. Pienazek, S. A., and Christopher, E. P. 664.85: 632.693.2
The use of carbon dioxide for controlling rodents in cold storage rooms.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 93-6, bibl. 6.

The writers conclude from trials in 1945 at State College, Kingston, Rhode Island, that "Carbon dioxide at a concentration of about 20% will kill rats and mice in storage at 32° in 3 to 5 hours. Rodents which have been previously subjected to low temperature for a period of time are more difficult to kill than those whose resistance has been lowered by a sudden temperature change. Methyl bromide at the recommended concentration of ½ lb. per 1,000 cubic ft. for 4 hours will kill both acclimated and non-acclimated rodents. From limited trials, it would appear that 25 to 30 lb. of dry ice per 1,000 cubic ft. storage capacity would be sufficient to kill rodents. There are indications from studies on apple scald that rodents and scald can be controlled simultaneously by treatment with carbon dioxide."

1763. Kardos, L. T., and Blood, P. T. 664.84.21.035.1: 633.491-1.532.2
Retardation of sprouting of potatoes by carbon dioxide storage.*
Amer. Potato J., 1947, **24**: 39-47, bibl. 10.

Treatment of [heavy paper] bagged potatoes in New Hampshire with 0·9 g. and 0·45 g. of methyl ester of alpha-naphthaleneacetic acid per bushel was more effective in retarding sprouting than CO_2 treatments which had less than 8% CO_2. A highly effective CO_2 concentration was found to lie in the range of 10-12% CO_2 and in such cases short periods of several days with the concentration down to 8% or up to 14% did not seriously affect results. The sprout retarding action of the CO_2 treatment persists after removal to normal atmosphere. Further study of this persistence is necessary before the practice can be recommended.

1764. Whiteman, T. M., and Wright, R. C. 664.84.22
The effects of temperature on losses in sweet-potatoes.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, **48**: 437-42, bibl. 4.

Storage temperatures of 55° to 60° appeared best for both

* See also 1432-1434.

raw and cured sweet potatoes in tests at Beltsville, Md. Waxing was not beneficial in sweet potatoes stored for 3 months.

1765. FURLONG, C. R. 664.84.64
The storage and ripening of green tomatoes.
Agriculture, 1946, 53: 313-6.
This is a summary of results of experiments carried out in 1943 by the Food Investigation Board of the D.S.I.R. and reported more fully in *J. Pomol.*, 1946, 22: 197-208; *H.A.*, 17: 1034, *q.v.* [Anyone proposing to lay out his capital on devices for ripening tomatoes would be well advised to study both these articles before doing so.—ED.]

1766.
a HAUT, I. C. 664.85.11
The effect of different post-storage temperatures on the firmness and condition of Richared Delicious.
Proc. Amer. Soc. hort. Sci. for 1946, 1946, 48: 97-9.

b WEIL, B. H., AND STERNE, F. 664.8.037
Literature search on the preservation of food by freezing.
Spec. Rep. St. Engineering Exp. Stat., Atlanta, Ga, 23, 1947 (?), pp. 409, U.S. $4.00, reviewed in *Canad. Fd Packer*, 1947, 18: 4: 25.

PROCESSING* AND PLANT PRODUCTS.

1767. BURGER, I. J., AND LE RICHE, F. J. H. 664.84
Studies on the processing of vegetables. Part I.
Sci. Bull. Dep. Agric. S. Afr. 253, 1946, pp. 8, bibl. 7, being *Fruit Res. tech. Ser.* 8.
(*a*) *Burger: Some problems of the industrial utilization of vegetables, pp. 1-2.* Until recently little work on the processing of vegetables has been done in South Africa, and the varieties preferred by growers are generally unsuitable for preservation purposes. However, research on the commercial utilization of vegetables is now being carried out at the Western Province Fruit Research Station in close co-operation with the Vegetable Research Station, which works on the improvement of vegetables, both as regards quality and production methods. The latter Station was established on the Cape Flats in 1939 under the control of the Stellenbosch-Elsenburg College for Agriculture.
(*b*) *Le Riche: Ascorbic acid (vitamin C) content of some pea, turnip and potato varieties, pp. 3-8.* This study was carried out on one season's turnips, peas and potatoes. The varietal influence on ascorbic acid content was marked in all cases, and with turnips the seedsman (not considered in the case of the other vegetables) was found to be an important factor. Vitamin C content of fresh, dehydrated and canned turnips was determined as 29-10, 1·00-0·43 and 19-12 mg. per 100 g. respectively. With peas the stage of maturity was found to have a great influence on vitamin C content, average values for small immature and large mature peas being 50·67 and 30·52 mg. per 100 g. respectively. Ascorbic acid destruction in dehydrated peas was very high, while potatoes retained a fair percentage of their vitamin C content on dehydration.

1768. ZWEEDE, A. K. 664.84+664.85
Der verwerking van tuinbouwproducten en hun voedingswaarde. **(The processing of garden produce and its food value.)**
Overdr. Inst. Onderz. Verw. Fruit Groenten, Wageningen, 4, reprinted from *Landbouwk. Tijdschr.*, 1946, 58: 567-86.
The author discusses the meaning of the term " processing " and gives an account of the food value of garden products with reference to their caloric value, mineral and acid content, fats, proteins, and enzymes. The factors that result in the deterioration or spoiling of the products are described and the various methods of preservation are discussed.

1769. ADAM, W. B. 664.84: 577.16
The nutritive value of vegetable products.
J. roy. sanit. Inst., 1946, 66: 368-75, bibl. 14.
The author discusses in turn the data available on the nutritive value of cooked, canned, dried and frozen vegetables and vegetables in pickles, sauces, chutneys, etc. The chief value of vegetables lies in their vitamin content, especially that of vitamin C. He concludes as follows:

" . . . Losses in home cooking vary greatly with the final form of the trimmed vegetable and with the method of cooking, the average losses being about 45 to 50% of sugars, 15 to 20% of protein, 30 to 35% of mineral salts (the percentage losses of potassium and magnesium being higher than those of phosphorus, iron and calcium), 25 to 30% of vitamin B_1, 20 to 25% of riboflavin, and 50 to 60% of vitamin C. The corresponding losses in canned vegetables are not significantly different, except that of vitamin B_1, where the average is about 45 to 50%. Vegetables are generally in a fresher condition when canned than when purchased in shops for cooking in the home, and consequently the vitamin C content of the canned product is often greater than that of the similar article cooked in the home. Dried vegetables may contain rather less vitamin C than home-cooked vegetables and, if they have been treated with sulphite, the vitamin B_1 content may be considerably reduced. The nutrition value of frozen vegetables is quite equal to that of the home-cooked or canned products. The figures quoted in this paper indicate that the nutritive value of vegetables processed by modern methods is quite comparable with, and in some cases may be superior to, that of the fresh vegetables cooked by the methods commonly adopted in the home."

1770. PROKOŠEV, S. M., AND DANČEVA, E. I. 577.16
Factors of ascorbic acid biosynthesis. [Russian, English summary 10 lines.]
Biohimija, 1946, 11: 481-92, bibl. 12.
Not only potato, but also onion, garlic and apple show marked ascorbic acid biosynthesis when injured. In green tomatoes, green physalis, carrot and pumpkin the reaction is less pronounced. In other plants tested the ascorbic acid content was practically constant when small pieces of the plants were stored for 2 to 3 days in the air. The action is strongly inhibited by carbon dioxide; this effect does not depend on the oxygen content of the air, but it increases with the concentration of CO_2, and wound biosynthesis stops when the CO_2 content reaches 5%. Ascorbic acid synthesis is stimulated by introducing neutral or acid phosphate into the tissues but alkaline phosphate inhibits it; it is favoured by light, but air moisture has no effect.

1771. KORJAKINA, V. F. 577.16: 635.1/7: 581.02
The influence of external conditions on the accumulation of ascorbic acid in vegetables. [Russian.]
A symposium on scientific work carried out at Leningrad, 1941-43, 1946, pp. 331-8, bibl. 6. Komarov bot. Inst. Acad. Sci. U.S.S.R., Leningrad.
Experiments were made in 1943 with parsley, dill, cucumbers, tomatoes, sorrel, celery, radishes, Chinese cabbage and lettuce both in the open and under glass. All plants grown under glass had a smaller vitamin C content than those cultivated in the open. A decreased vitamin content was found in leaves, stems, fruit and roots; in particular the

* See also 1170, 1171.

roots of parsley grown in the hothouse had 96% less vitamin C than those planted in the open. It is interesting to note that cucumbers grown in the hothouse had only traces of the vitamin, and that it was entirely absent in celery roots cultivated under glass. Further experiments were made with varieties of turnip, swede, radish, kohlrabi, carrot, onion, spinach, table beet and lettuce grown either in the sun or in the shade. The leaves of all plants grown in the shade contained 11·8 to 62·5 mg.% less vitamin C than those cultivated on a plot exposed fully to sunlight.

1772. KORJAKINA, V. F. 577.16: 635.1/7
The ascorbic acid content of vegetable leaves at different times of day. [Russian.]
A symposium on scientific work carried out at Leningrad, 1941-43, 1946, pp. 339-44, bibl. 4. Komarov bot. Inst. Acad. Sci. U.S.S.R., Leningrad.

Determinations of vitamin C content were made in July, August and September in the leaves of peas, radishes, swedes, turnips, dill, sorrel, lettuce, table beet, parsley, cabbage, onions and spinach. Samples were taken for examination at 8 a.m., 1 p.m., 4 p.m. and 7 p.m., on sunny days. In July the vitamin content rose by 14 to 35% between 8 a.m. and 1 p.m., the greatest increase being found in the leaves of swede, beet, turnip, dill and celery. In August the increase was noted in all plants—except onions and cabbage, in which the vitamin content remained unchanged throughout the day—towards the end of the day. Similar results were obtained in September. Although considerable variation in the vitamin C content was observed in individual plants, there was a general tendency in nearly all plants for it to be at its lowest level in the morning and at its highest towards the evening. Special experiments with cabbage indicated that covering its leaves with black cloth between 6 and 7 p.m. and removing the cloth between 6 and 7 a.m. the following morning increased the vitamin C content, in comparison with the controls, by 15·8% in August and by 36·0% in September.

1773. GEIGER-VIFIAN, A. 634.11: 577.16
Der Vitamin C-Gehalt in schweizerischen Apfelsorten. **(Vitamin C-content of Swiss apples.)**
Reprinted from *Schweiz. landw. Monatsh.*, 1945, Heft 11, pp. 7.

The vitamin C content of over 80 apple varieties grown at Wädenswil was determined in April and in the autumn of 1945, the results being tabulated. Variation due to locality, maturity and other factors proved considerable, even the values for apples of a single Boskoop tree differed by nearly 100% (22·3 and 11·8 mg.%). There was no relation between sugar or acid content, or chromosome number and vitamin C content, but it is suggested that some connexion exists between vitamin C content and the content of oxidation enzymes. On the whole, it was found, Swiss apples represent a valuable source of the vitamin. Because of its great variability vitamin C content should not be taken into consideration in a breeding programme.

1774. OLEJNÍČEK, H., AND HANZELKA, F. 577.16: 634.23 + 634.7
Obsah vitaminu C v moravském ovoci. I. Třešně, višně a drobné ovoce. **(The vitamin C content of Moravian fruit. I. Sweet cherries, acid cherries and soft fruit.)** [German summary 1 p.]
Reprinted from *Ann. Acad. tchécosl. Agric.*, 1942, 17: 154-62 [received 1947].

The vitamin C content of both sweet and acid cherries was found to be very low. It proved to be related to fruit colour, dark-red to brown varieties being richer in the vitamin than yellow or pink varieties. Early varieties of sweet cherries, moreover, had a higher vitamin C content than late varieties. In contrast to cherries, currants, gooseberries and raspberries proved to be a good source of vitamin C. There were no differences in ascorbic acid content between red and white varieties, black currants being, of course, superior to the rest. The values found are tabulated in detail, together with a few other relevant data.

1775. DADYKIN, V. P., AND BOZOJAN, O. A. 577.16: 634 + 635
Evaluation of the vegetation of the Vorkuta region from the view point of vitamin content. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1946, No. 7-8, pp. 31-3.

The possibility of obtaining vitamin C from vegetables and fruit in the Vorkuta district, the most northerly industrial region in Russia (about 68° latitude), is discussed, and the extraction of the vitamin from red currant leaves, a source of some value for that region, is described.

1776. TRUSCOTT, J. H. L., AND OTHERS. 577.16: 634.1/8 + 635.1/7(713)
A survey of the ascorbic acid content of fruits, vegetables and some native plants grown in Ontario, Canada.
Department of National Health and Welfare, Ottawa, 1945 (?), pp. 104.

This survey was conducted over a period of several years and includes a large number of varieties of all kinds of fruits and vegetables commonly cultivated in Ontario. Most of the material was grown either at Vineland or at Guelph. Samples were assayed first in a fresh condition and later after such storage or processing treatments as are ordinarily given. The data obtained in the investigation are presented in great detail in two tables and in numerous charts assembled in 50 plates and accompanied by an explanatory text. The following are some of the points mentioned in the discussion of the results: (1) Light, more than any other environmental factor, seems to have some influence on ascorbic acid content, as indicated by shading experiments and observations. Five days of continuous shade were found to reduce the ascorbic acid content in leaf lettuce and probably in mustard leaves by roughly one half. To some extent it was possible to control the amount of ascorbic acid present by successive removal and application of shade. Tomatoes harvested under glass in January contained about one-half the ascorbic acid found in the same variety in July or August, either under glass or outside. The winter-summer variation in the ascorbic acid of tomatoes is therefore presumed to be due to variation in light intensity. Trials suggest that tomatoes growing in a glasshouse in March need only have a relatively small proportion of leaf area exposed to full illumination in order to develop maximal ascorbic acid content. In lettuce and carrots low ascorbic acid contents were found to be associated with late autumn harvests. (2) The data indicate that to a certain degree the ascorbic acid content is determined by the genotype, but genetical differences between varieties are usually masked by environmental factors. Nevertheless, breeding is considered a possible means of increasing ascorbic acid content in fruits and vegetables, the tomato variety Vetomold, with *Lycopersicon pimpinellifolium* in its ancestry, being quoted as an example. On the other hand, ascorbic acid-rich plants cannot be selected on a taxonomic basis. (3) Locality and fertilizer treatment were found to have no influence on ascorbic acid content.

1777. PRICE-DAVIES, W. 664.84.34.047: 577.16
A comprehensive survey of the ascorbic acid content of dehydrated cabbage prepared in the factories operating in the United Kingdom in the season 1945.
J. Soc. chem. Ind. Lond., 1947, 66: 29-31, bibl. 9.

Ascorbic acid retention in cabbage, dehydrated in 17 factories in the U.K., in the 1945 season averaged 30% after recon-

stitution and cooking, as against 50% in fresh cabbage cooked under optimum conditions. There was little variation in ascorbic acid retention between different varieties and between the products of different factories. The ascorbic acid content of the cabbage produced was fairly constant throughout the period of the investigation, i.e. from July to December.—Government Laboratory, London, W.C.2.

1778. OLLIVER, M. 635.34: 577.16
The cabbage as a source of ascorbic acid in human diet.
Chem. Industr., 1947, No. 18, pp. 235-40, bibl. 21.

(1) The distribution of ascorbic acid in any one head of cabbage is extremely uneven. There may also be very wide variation in ascorbic acid content between different heads of cabbage grown from identical seed in one plot and cut at the same time. (2) Spring varieties of cabbage grown to mature in summer show, in general, somewhat higher values than do summer or autumn types. In addition, the paler summer types give slightly lower ascorbic acid values than the darker green summer or autumn cabbage. (3) Up to 7 days' storage under normal conditions did not appear to have any appreciable effect on the vitamin C content of raw cabbage. (4) Figures are given for the anti-scorbutic values of various samples of dehydrated cabbage. In general, the spring types of cabbage retain their ascorbic acid content to the same degree on drying and therefore the dried spring types tend to be higher than the dried autumn and summer types. (5) About 60% of the total ascorbic acid content of the cabbage is lost during factory processing. (6) After 6 months' storage at room temperature, the loss of ascorbic acid in dehydrated cabbage packed in nitrogen is negligible. (7) On reconstitution, dehydrated cabbage only recovers about 50% of the original moisture content, and then contains amounts of ascorbic acid comparable with those of the fresh material cooked according to normal household practice. (8) Normal storage of cabbage for several days before cooking does not affect the subsequent retention of ascorbic acid. (9) The method recommended by the Ministry of Food for the cooking of cabbages results in a much higher retention of ascorbic acid than is possible with the usual household method. [From author's summary.]

1779. BAKER, L. C., AND PARKINSON, T. L. 635.64: 577.16
Vitamin C content of vegetables. Part VI. Tomatoes.
J. Soc. chem. Ind. Lond., 1947, **66**: 1-2, bibl. 17.

The tabulated data show (1) considerable variation in vitamin C content within the same variety and even in fruits from the same truss (inter-truss variation studied only for unripe tomatoes); (2) that ripe and outdoor tomatoes have a higher vitamin C content than unripe and glasshouse tomatoes respectively; (3) that tests with 5 varieties in 1943 and with 6 varieties in 1945 failed to show any significant inter-varietal differences in vitamin C content.

1780. HALLSWORTH, E. G., AND LEWIS, V. M. 635.64: 581.192
Some factors affecting the ascorbic acid content of tomatoes in New South Wales.
Emp. J. exp. Agric., 1947, **15**: 132-46, bibl. 13.

Loss of ascorbic acid from tomatoes in storage is appreciable for a few days, but thereafter the rate diminishes. The author examines this loss and gives the correlation between the ascorbic acid content and various factors. A marked variation in ascorbic acid content was demonstrated in all varieties studied; also a significant difference among different varieties, although the influence of locality on the ascorbic acid content has been shown to be greater than that of variety.

1781. BOOTH, V. H. 634.31: 577.16
Vitamin A activity of orange peel pigment.
[Russian, English summary 4 lines.]
Biohimija, 1947, **12**: 21-5, bibl. 8.

The vitamin A activity of the ester of citraurin, a carotinoid pigment, extracted from orange peel, is less than 10% of that of β-carotin and is probably nil.—Dunn Nutritional Lab., Cambridge.

1782. CONNOLLY, F., HILTZ, M. C., AND ROBINSON, A. D. 635.1/7: 577.16
Thiamin in Manitoba vegetables.
Canad. J. Res., 1947, **25**, Sec. C, pp. 43-53, bibl. 27.

The thiamin contents of Manitoba grown vegetables are similar to those of vegetables from elsewhere. The amounts vary with the vegetable and the variety, with a wide range within a single variety. On an average, boiled vegetables retain 63% of their thiamin, 23% is dissolved in the cooking water, and 14% is destroyed. Storage of raw vegetables does not appreciably diminish their thiamin contents. Canning causes losses which vary with the vegetable and with the time of blanching and processing.

1783. CHARLEY, V. L. S. 613.2: 634.1/8 + 663.813
The nutritive value of fresh fruits and fruit juices.
Chem. Industry, 1947, No. 17, pp. 220-4, bibl. 4.

Data are compiled on the nutritive value of fruits, the ascorbic acid content of fruits, the chemical composition of fruit juices, nutrients of fresh California orange juice, and nutritional constituents in what can be considered a peace-time average daily consumption of apple juice and black currant syrup.

1784. MELVILLE, R. 613.2: 634.5
The nutritive value of nuts.
Chem. Industry, 1947, No. 22, pp. 304-6.

Tabulated data are presented of the starch, fat, and protein content of farinaceous and oily nuts, of the vitamin A, B_1, B_2, and C content of certain nuts, of the vitamin C content of immature *Juglandaceae* fruits, and of the vitamin C distribution in the immature walnut. The pecan, groundnut and Brazil nut are particularly good sources of aneurin. The walnut and its allies of the *Juglandaceae* are exceptionally high in vitamin C content when they are nearly full-grown, just before the shells begin to harden. When pickled, they should remain green, or white if the centres only are used. The vitamin is destroyed by methods in which the nuts are turned black.

1785. CHARLEY, V. L. S. 613.2: 664.85.035.5
The nutritive value of preserves and honey.
Chem. Industry, 1947, No. 20, pp. 271-2, bibl. 6.

The ascorbic acid content of 16 jams and 3 rose hip products is given, in addition to an analysis of honey and to the calorific values of jams and honey.

1786. DAVIES, R. 664.8.037
Low temperature research.
Fmg S. Afr., 1947, **22**: 312-4.

A short account of the investigations in progress at the Low Temperature Research Lab., Capetown. These include investigations into dehydration and canning of vegetables; enzymes in blanched vegetables; nutritive value of fruits and vegetables; citrus wastage.

1787. DREOSTI, G. M. 664.8.047 + 664.8.037
Dehydration and cold storage of food products.
Fmg S. Afr., 1947, **22**: 331-8.

Dried vegetables delivered to the Admiralty for use in the tropics were lime-packed to reduce the moisture content. A method for preparing sliced, dehydrated root vegetables, instead of strips or dice, is described. In this method a short pre-cook of 3 minutes reduced peeling-losses by half and trimming-time by 15%. Unshelled peas stored for

12 hours gave a better product than shelled peas stored under water. By using sodium sulphite the blanching-time required to inactivate enzymes was reduced from 10 minutes, using water, to 3 minutes using a 0·2% sodium sulphite solution, while at the same time the product was superior to steam-blanched vegetables. By adding glucose to the blanching solution the reconstitution value of the dehydrated vegetables is increased. It is considered that dehydrated potato-mash and mash powder will probably find a greater demand than dehydrated strips or slices. Methods for manufacturing potato-mash, potato-mash powder and puffed potatoes are described. A great demand for potato-mash powder is anticipated. The possibility of incorporating the waste from beetroot and carrot tops, and the outer leaves of cauliflower and cabbage, in soup mixtures is being explored. Investigations were carried out on the air-drying of green peas to evolve a method suitable for farmers. Work continued on the search for a simple and cheap method for extracting a pectin product from citrus peels. A bin-type of drier for chicory was designed and constructed. This produced a better product than local or imported root dried by conventional methods.

1788. LAWRENCE, G. N., SCOTT, A. W., AND BARNELL, H. R. 664.84.047+664.84.21.047
Dehydrated potatoes and vegetables.
Final Report British Intelligence Objectives Sub-Cttee **186**, item **22**, pp. 87+39.
Brief accounts, illustrated, of commercial processes developed in Germany.

1789. BARNELL, H. R., AND GREENHAM, D. W. P. 664.84.21.047
The effect of variety and source on the quality of dehydrated potatoes.
Chem. Industry, 1947, No. 23, pp. 315-8, bibl. 8.
King Edward potatoes grown on siltland were found to give a dehydrated product of consistently high quality over a period of years, while other varieties or King Edward potatoes from other soils are liable to stem-end blackening or certain processing drawbacks.

1790. RUSSELL, J. 632.944
Determination of fumigants. Part XVIII. Determinations of low concentrations of methyl bromide.
J. Soc. chem. Ind. Lond., 1947, **66**: 22-6, bibl. 9.
The rapid method described for determining small quantities of methyl bromide in gas samples, collected during fumigation and airing, was developed at the Imperial College of Science and Technology, London, on behalf of the Australian Dried Fruits Board.

1791. LE RICHE, F. J. H. 664.85.047: 613.2
Nutritive value of certain dried fruits. Influence of size grades on chemical composition.
Fmg S. Afr., 1947, **22**: 25-8, 40, bibl. 11.
In this investigation the following dry fruits were used: Apple rings, peaches, pears, apricots (Royal), prunes. Four size grades of each fruit were analysed for the following constituents: Protein, carbohydrate, ash, P, Fe, Ca, K. The tabulated results show that the size of dried fruits has no significant effect upon composition. Neither was the β-carotene content of dried apricots, peaches, pears and prunes found to be affected by size grades. The role of dried fruits in the human diet is discussed.—W. P. Fruit Research Station, Stellenbosch.

1792. MCNARY, R. R. 664.85.3.036.5
Industrial wastes. Citrus canning industry.
Industr. Engng Chem., 1947, **39**: 625-7, bibl. 6.
With the rise in citrus production in Florida from 29·5 million boxes in 1936 to 86 million boxes in 1946 and with an increase in processing to 69% of the grapefruit crop and to 38% of the orange crop, the disposal of wastes has become a formidable problem for the canning industry. The paper is concerned only with by-products, which have some relation to pollution and the creation of nuisances.—Citrus Products Station, Winter Haven, Fla.

1793. ZWEEDE, A. K. 635.656+664.84.656.036.5
Doperwten in blik. **(Canning green peas.)**
Tuinbouw, 1947, **2**: 35-9.
The history of green peas as an article of food is outlined and their food value is shown by a chemical analysis (including vitamin content). A full description of the canning process is illustrated by photographs.

1794. JONES, A. H., AND PIERCE, M. E. 664.84.64.036.5
Quality control of canned tomato products.
Canad. Fd Packer, 1947, **18**: 2: 19-23.
Low mould counts in canned tomatoes follow the use of well washed, sound, or well trimmed, fruits; a competent analyst, properly equipped, should check the mould count of the product.

1795. MCKIRAHAN, R. D. 664.85+664.84
pH. Its influence on the processing of fruits and vegetables.
Canad. Fd Packer, 1946, **17**: 11: 19-21, bibl. 20
The pH value in its relation to the thermal process of rendering canned food commercially sterile is discussed under (1) meaning of the term pH, (2) definition of acid and low-acid foods, (3) classification of foods with respect to pH, (4) physiological aspects of *Clostridium botulinum*, (5) heat resistance of common micro-organisms, (6) factors influencing the pH of foods, (7) behaviour of spoilage organisms and (8) processing of acid foods the pH of which is controlled.

1796. ŠEVCOV, T. 663.25
Thirty-thousand litres of wine a year. [Russian.]
Kolhoznoe Proizvodstvo (Collective Farming), 1946, No. 8, pp. 37-8.
From surplus grapes or fruits on a collective farm in Tula Province. Achievement noted but methods not described.

1797. GENEVOIS, M. 663.813
Les jus de fruits, naturels et concentrés. **(Fruit juices, natural and concentrated.)**
Cours Conf. Centre Perf. Tech. **817**, 1942, pp. 8, bibl. 36 [received 1947].
The preservation of fruit juices and syrups in the home augments the supply of vitamin C in winter, and on a large scale it can overcome market gluts after heavy harvests. Juice concentrated to 36° Beaume may be stored in barrels with SO_2 and bromacetic acid.

1798. FLANZY, —. 663.813: 634.8
Nouvelles bases d l'industrie de jus de raisin. **(New methods of processing grape juice.)**
C.R. Acad. Agric. Fr., 1947, **33**: 139-42.
Two methods of desulphiting grape juice are briefly described (1) The juice is brought to the boiling point as rapidly as possible by bubbling through it for 10 minutes a rapid current of steam. (2) The juice is boiled under reduced pressure for 10-15 minutes.

1799. ANON. 634.11: 663.813
Scotian Gold producing apple essence.
Canad. Fd Packer, 1947, **18**: 4: 47.
The aroma of fresh apples is concentrated into apple essence, a new flavouring for ice-cream, etc., in Nova Scotia.

1800. POLLARD, A., KIESER, M. E., AND BRYAN, J. 634.723: 663.813: 577.16
The stability of ascorbic acid in blackcurrant syrup.
Chem. Industry, 1946, No. 45, pp. 402-3, bibl. 7.
The practical conclusions reached are that "bottling black currant syrups under anaerobic conditions gives a

slightly higher retention of ascorbic acid in the earlier storage period, but that the rate of loss is not subsequently affected. At the same time, it is advisable that the head space in the bottle be as small as is practicable."—Work under D.S.I.R. at Long Ashton.

1801. ATKINSON, F. E., STRACHAN, C. C., AND GITTERMAN, C. O. 663.813: 635.64
Quality in tomato juice. Part I. The tomato juice line. Part II. Results of vitamin C analyses. Part III. Relation of mould counting to quality.
Canad. Fd Packer, 1946, **17**: 7: 27, 29; **17**: 8: 23, 25, 27; **17**: 9: 35.

A series of 3 papers, one by each author in the order given. The general qualifications of a good tomato juice are stated to be (1) bright colour, (2) good flavour, (3) desirable consistency, (4) high vitamin C content, and the processing should aim at attaining these qualities in the finished product. Part I deals with the technique of processing—washer, sorting belt, mill and pump, extractor and pump, preheater, salt dispenser, filler, closing machine, cooker and cooler. Part II covers the results of vitamin C analyses of commercial samples and experimental packs. Certain precautions are emphasized to preserve the vitamin content, e.g. it is found important to heat the crushed tomatoes quickly to at least 190° F.; this inactivates oxidase enzymes, which, in a minute, can destroy significant quantities of ascorbic acid. Tomatoes or tomato juice must not come in contact with copper at any time, as even traces of this metal in the juice will cause a loss of ascorbic acid both while processing and after canning during storage. Traces of iron further increase the loss. Stainless steel is a very satisfactory metal for processing equipment. Part III discusses briefly the Howard mould counting method for determining the microbiological quality of tomato juice [see abstract 1803].

1802. ANON. 663.813: 635.64
Pre-sterilization of canned tomato juice.
Canad. Fd Ind.,* 1947, **18**: 6: 8.

An abstract of a paper by P. Sognefest and J. M. Jackson in *Food Technology*, January, 1947. Flat sour spoilage has not been reported in juice pre-sterilized in heat exchangers.

1803. TROY, V. S. 635.64: 632.4
Mould counting of tomato products.
Canad. Fd Packer, 1946, **17**: 6: 20-3, 27.

The Howard method for determining the amount of mould in tomato products is described. It was designed (1) to enable the U.S. Food and Drug Administration to prevent shipment in inter-state commerce of tomato pulp or other strained tomato products which were made from mouldy or decomposed material; (2) to give the manufacturers a method for checking their own product by determining if their sorters and trimmers were doing good work. The method involves a microscopical examination of samples of the product. The fungi and types of mycelium that may be encountered are briefly mentioned.

1804. FRIAR, H. F., CRUESS, W. V., AND SEAGRAVE-SMITH, H. 663.813
Fruit granules and powders.
Fruit Prod. J., 1947, **26**: 228-9, bibl. 2.

Granules were made by forcing a mixture of 1 part fruit concentrate (65-72° Brix) and 1½ to 5 parts by weight of a proprietary anhydrous dextrose, through a $\frac{1}{16}$-in. Monel metal screen; the granules may be air-dried, but a dehydrator improves keeping quality. Granules, if dry and rich in dextrose, can be powdered. Dried apricots (30% moisture) with 2 parts dextrose were made into granules, powder and tablets; other dried fruits were less satisfactory. The authors believe these products have commercial value.—University of California.

* Now incorporating *Canadian Food Packer*.

1805. SINCLAIR, W. B., AND ENY, D. M. 634.3: 581.192
Ether-soluble organic acids and buffer properties of citrus peels.
Bot. Gaz., 1947, **108**: 398-407, bibl. 15.

The concentrations of ether-soluble organic acids are much lower in peels of citrus fruits (oranges, grapefruit, and lemons) than in juice samples of corresponding pulps. The high pH values of the peel saps indicate that most of the organic acids are present in the salt form and not in the free state. The total non-volatile organic acids were extracted from dried peel of citrus fruits. The organic acid content consisted chiefly of citric, malic, and oxalic acids. The citric acid content is very low in comparison with the concentrations of malic and oxalic acids. The oxalic acid is present in the peel as insoluble calcium oxalate, with the exception of a trace occurring in the peel sap. The titration curves of peel saps of citrus fruits (navel and Valencia oranges, grapefruit, and lemons) show that these systems contain comparatively small amounts of organic acids and their salts. In the absence of these constituents the pH values of the peels are high, and these systems consequently have only a slight buffer capacity. [From authors' summary.]

1806. DIXSON, R. A. 663.93
Coffee essences and powders.
Food, 1947, **16**: 19-22.

A description is given of the Kestner patented process. After countercurrent extraction, the liquor is concentrated in a climbing film evaporator under a high vacuum at 40° C., after recovery of the esters. The resulting essence may be spray-dried by centrifugal atomization.

1807. BEMIS, K. P. 633.491-1.57
Merchandising by-products and potato-packages.
Amer. Potato J., 1947, **24**: 123-6.

Among possible uses for surplus potatoes the following and the problems involved are discussed: beverage and industrial alcohol, starch, glucose and cattle food.

1808. LAMPITT, L. H. 633.72: 663.952.1/4
Science and tea: an historical survey.
BRADFIELD, E. A.
Recent developments in the chemistry of tea.
Chem. Industry, 1946, No. 5, pp. 49-50.
BRADFIELD, E. A.
Some recent developments in the chemistry of tea.
Chem. Industry, 1946, No. 26, pp. 242-4, bibl. 23.

The discussion on these papers before the Food Group on 16 January, 1946, and short notes of their contents are given in the earlier number of the journal. Bradfield's paper is given in full in the later number.

1809. LAMB, J. 663.952.1/4
Tea manufacture.
Tea Quart., 1946, **18**: 74-82.

In this address given on 14 August, 1946, to the Ceylon Association in London, the subject is dealt with under three heads: pure research; applied science; and invention, including long-term projects. The principal contribution of pure science has been the discovery that the enzyme concerned in tea fermentation is a copper protein compound. In the attempt to improve manufacturing methods by applied research the chief object has been to eliminate the withering process which in its present form is responsible for a disproportionate part of building and working costs and is directly responsible for factory fires. Withering is little more than a means for making rolling possible. The problem is to kill the leaf and destroy its resistance to withering without destroying the enzyme responsible for fermentation. Freezing and thawing is a possible means of achieving this but is likely to prove too expensive. Dehydration is another possible method. Rolling is dealt with more fully and possible improvements are described. As to

future developments in manufacturing methods, it is asked why the industry should remain bound to a particular style of product, if a good liquoring product can be made by cheaper and simpler processes, the nature of which is indicated.

1810. KURSANOV, A. L., AND KRJUKOVA, N. N. 633.72-1.56
Respiratory processes in tea leaves during fermentation. [Russian, English summary 20 lines.]
Biohimija, 1947, **12**: 69-78, bibl. 14.
Tea leaves placed in a moist chamber at room temperature soon lose their stored carbohydrates. Under such conditions the starved leaves, depleted of sugar, undergo a "vital fermentation" of catechols resulting in the formation of a red-brown pigment in the living cells.

1811. BOKUČAVA, M. A. 633.72-1.56
On the fermentative oxidation of different fractions of the tea tannins. [Russian, English summary ½ p.]
Biohimija, 1947, **12**: 59-68, bibl. 13.
It is shown that tea tannin is formed by oxidation of the low-molecular fractions, the polyphenols and catechols.

1812. ANON. 633.834-1.56
A cracking machine for nutmegs invented.
Agric. Amer., 1947, 7: 97.
An electrically operated machine has recently been constructed in Grenada, B.W.I. It will crack 200 lb. of nutmegs in about 1½ minutes without, apparently, injuring the nuts.

1813. BAUMGARTNER, J. G. 664.583
The production of cured vegetables for pickle manufacture.
Chem. Industry, 1947, No. 25, pp. 350-3, bibl. 12.
The British pickling industry, forced out of the market by competition from abroad in the beginning of this century, has come back into its own during the recent war. The chief difficulty with which the briners had to contend was lack of technical experience of the curing process and the causes and control of spoilage. In his paper read before the Microbiological Panel of the Food Group and the Society of Applied Bacteriology, the author describes the technique of vegetable curing.

1814. CRUESS, W. V., AND SUGIHARA, J. 634.63: 581.192
Oxidase of the olive.
Abstract in *Food*, 1947, **16**: 207.
A study of the principal oxidizing enzyme (a phenolase) of the olive; its importance in processing is due to the risk of oxidasic oxidation making green pickled olives brown, and to the possible desirability of such action in blackening ripe-process olives.

1815. SPECK, L. W. 633.85
Essential oils essential to the food flavourings industry.
Canad. Fd Packer, 1946, **17**: 9: 23, 25, 27, 29.
Essential or volatile oils, while having wide cosmetic and pharmaceutical uses, are equally important for flavouring all kinds of beverages and food products. This article is a survey of the regions where essential oils are produced and of the methods of preparing oils of orange, lemon, lime, wintergreen, peppermint, thyme, origanum, cloves, and the production of pepper and cinnamon.

1816. GOETHALS, G. 633.85
De geraniumolie van Belgisch-Congo. (Geranium oil in the Belgian Congo.) [French summary 1 p.]
Bull. agric. Congo belge, 1942 (Bruxelles), **33**: 106-23, bibl. 11 [received 1947].
Geranium oil has been produced on a commercial scale at Kivu and Ituri since 1930. It is the product of different sorts of *Pelargonium* which are grown successfully to give a return in essential oils, on distillation, of 1·5 to 2·0 per thousand. Analytical figures show that the geranium essences are of excellent quality. Their composition is discussed in some detail.

1817. COSGROVE, D. J., AND ISLIP, H. T. 633.833
Cinnamon leaf oil from Seychelles.
Bull. imp. Inst., 1946, **44**: 287-90.
Examination showed that the earlier fractions contained less eugenol and more cinnamic aldehyde than the later ones. The opinions of the trade were, on the whole, unfavourable to these early fractions compared with Ceylon cinnamon leaf oil; further, they were not sufficiently near to Ceylon oil in quality of odour to justify a recommendation for fractionation of straight oil on a commercial basis.

1818. COSGROVE, D. J., AND ISLIP, H. T. 633.81
Lemongrass oil from Trinidad.
Bull. imp. Inst., 1946, **44**: 290-2.
The sample examined was of the type known as East Indian or Cochin, distilled from *Cymbopogon flexuosus*. The results of the examination are given. The oil should be able to compete on level terms with Cochin lemongrass oil, even in a normal market.

1819. COOMBER, H. E., AND COSGROVE, D. J. 633.956
***Ocimum suave* from Kenya.**
Bull. imp. Inst., 1946, **44**: 292-5.
The composition of the oil is given. It seems unlikely that the oil would have any considerable market value. A possible use would be in the perfuming of soap, but the price would be low owing to the many competitors.

1820. PIDFORD, J. H. 678.113
Latex preservation, concentration and shipment.
Plant. Man. Rubb. Res. Inst. Malaya **4**, 2nd edition, 1947, pp. 76, bibl. 11.
This second edition brings the original manual, published in 1932, up to date. Many growers faced with the need for reconstruction of estate factories are now considering the production and export of fluid latex instead of smoked sheet. The suitability of this processing method depends largely on the dry rubber content and certain other properties of the latex produced. Where the requirements of latex quality are fulfilled, the cost of shipping—in steel drums or in bulk in steamer tanks—must be taken into consideration. Methods are discussed, among others, for handling latex in the field, for preservation and bulking of field latex, for latex concentration, and for packing and testing latex. Attention is drawn to gaps in our knowledge, which need elucidation by research and further development work. An appendix gives a survey of patents relating to latex processing.

1821.

a BUNKER, H. J. 613.2: 663.141 + 663.25
The nutritive value of yeast, beer, wines and spirits.
Chem. Industry, 1947, No. 16, pp. 103-5, bibl. 31.

b CHILD, R. 634.61-1.56
Coconut shells as an industrial raw material. IV. Coconut shell charcoal: (B) Activated carbon.
Curr. Sci., 1947, **16**: 5-8, bibl. 32.
Other papers in series noted in *H.A.*, 14: 2003; 15: 361.

c KIRJJALOVA, E. N. 663.25
Sterilization of wine with silver ions. [Russian.]
Proc. Lenin Acad. agric. Sci. U.S.S.R., 1946, No. 11-12, pp. 44-7, bibl. 10.

d MUDRA, A. E. 664.8.036.5
Quality evaluation of raw products for canning.
Canad. Fd Packer, 1947, **18**: 4: 19-25, bibl. 14.

e NAVES, Y. R. 633.812: 581.192
The analysis of lavender oils.
Soap san. Chem., 1946, **22**: 2: 40-73, 79, bibl. 19.

f PAUL, P. 664.85
Fruit purees.
Circ. Bull. Mich. agric. Exp. Stat. **200**, 1946, pp. 19.
Preparation for freezing, and recipes for use.

g VALAER, P. 663.25
Methods of analysis of wine.
J. Ass. off. agric. Chem. Wash., 1947, **30**: 327-31, bibl. 1.

h WIEGAND, E. H., AND OTHERS. 664.85.047 + 664.84.047
Home fruit and vegetable dehydration.
Stat. Bull. Ore. agric. Exp. Stat. **423**, 1944, pp. 27.

NOTES ON BOOKS AND REPORTS.

1822. DUTT, C. P., AND PUGH, B. M. 63(54)
Farm science and crop production in India.
Kitabistan, Allahabad, revised edition 1947, pp. 240, Rs. 12/.
The two parts of this book concern the theory of agricultural production (farm science) and the production of individual agricultural crops in India (crop production).
The only crops in which some of our readers will be interested are Tobacco, pp. 122-34, bibl. 19, and Potatoes, pp. 135-44, bibl. 19. The rest are field crops pure and simple.

1823. FOX WILSON, G. 632.6/7: 634/635
The detection and control of garden pests.
Crosby Lockwood & Son, London, 1947, pp. 194, 12s. 6d.
Many books have appeared in recent years on the control of pests of fruits and garden crops which may be regarded as of doubtful merit; it is therefore a distinct pleasure to read this work, which again and again shows the hallmark of accuracy.
The book starts with a short Foreword by Professor R. H. Stoughton, who rightly states that the work will be of immense value to the practical gardener and those associated with the control of horticultural and fruit pests.
The author's Preface is followed by an Introduction, a rather unusual one, but it will be read by the keen student, since it describes adequately the types of pest, the life-cycles of insects and their feeding habits, and finally gives a list of general references.
The substance of the book consists of eight chapters headed as follows: Bulbs, corms and tubers; Stems and shoots; Buds; Foliage; Flowers; Fruits; and, lastly, Seeds. The presentation of the book in this manner is a deliberate attempt by the author—who may be regarded as an essentially practical entomologist—to enable the layman to trace without difficulty the cause of the injury to his plants. Thus in chapter VIII, Fruits, one finds a large variety of insects ranging from the Apple Capsid Bug to the Tomato Moth and species of thrips.
To facilitate the reader's task still further, each chapter is sub-divided into headings. For example, in the Fruit chapter one finds "Fruit Blistered"; "Fruit Distorted"; "Fruit Dropping"; and "Fruit Punctured", etc., etc. This arrangement may be quite sound for the layman with little knowledge of the pest concerned in the damage, but it is a little irritating to the more experienced reader. Thus, should he desire to learn the whole story of the Apple Capsid Bug, he must perforce refer in turn to six separate pages.
Whilst it is realized that in a book of this nature, covering such a wide field, it is not possible to provide detailed control measures for every pest, it is a pity that some recommendations are not more explicit. For instance, to control Apple Blossom Weevil the author merely states that "the application of DDT in spring has given good results against this pest". In practice, DDT is efficacious, only if applied at the correct strength and at the optimum time, both of which are clearly understood.
Finally, one is grateful for a Horticultural Plant Index, a Scientific Index and a General Index.
As usual, the publishers have presented the book in a very readable manner with good, clear plates.
The author must be congratulated on placing before his readers a fund of information, which will undoubtedly and deservedly be in great demand. A.M.M.

1824. GARNER, W. W. 633.71
The production of tobacco.
Blakiston Co., Philadelphia, 1946, pp. 516, figs. 81, bibl. 266, $4.50.
Although there are countless bulletins on tobacco, there has been hitherto no authoritative work in which one could see the whole picture of the cultivation and production of tobacco. The present textbook is written "for the use of students . . . agricultural workers and planners who require a broad background of information on the fundamentals of tobacco production", and it gives the whole picture.
While largely concerned with conditions in the U.S.A., the author also touches lightly on salient features of tobacco growing in Puerto Rico, the Philippines, Canada, Cuba, Sumatra, Greece and Turkey.
The book is divided into 3 parts. Part 1, which is introductory, concerns the botany of the plant, world trade on a pre-war basis, and a history of the different phases of the industry in the U.S.A. Part 2, pp. 59-302, deals with all aspects of cultivation, including varieties used for different purposes, pests and diseases, curing, grading and marketing and costs. In Part 3 the author considers the basis of the cultivation practices advocated, namely "the theory of tobacco production and the findings of agronomic, physiological, biochemical and genetic research on tobacco production improvement and the very complex factor of quality in tobacco".
Author and subject indexes are included. The latter might with advantage have been rather fuller.
The expert and grower will be grateful for a most useful reference book; the mere smoker, chewer or snuff-taker for a fascinating account of how his favourite vice is fostered.

1825. GENDERS, R. 635.939.98
Chrysanthemums for pleasure and profit.
Littlebury, Worcester, 1946, pp. 80, 7s. 6d.
A useful guide for those intending to grow chrysanthemums for profit. The amateur, too, will find much that will help him to grow good plants, though the emphasis is on market work. Prices quoted are those of 1945, and at the present moment certainly these show no signs of falling from their seats in the stratosphere; but as "what goes up must come down", caution in estimating returns is advised.
The hints on advertising and the choice of medium are to the point and should save the inexperienced some ineffectual expenditure. Chrysanthemums will occasionally "sport", and produce branches bearing different coloured or shaped flowers to the rest of the plant. A method for fixing and quickly propagating these sports is described. The flower is removed, which should cause side shoots to emerge. These are taken off and treated as cuttings. G.St.C.F.

1826. GENEVOIS, L., AND RIBEREAU-GAYON, J. 663.253
Le vin. **(Wine.)**
Hermann, 6 rue de la Sorbonne, Paris, being No. **1017** of series *Actualités scientifiques et industrielles* (*Nutrition* **XX**), 1947, pp. 151, bibl. 446, 300 francs.

This monograph is one of a series on nutrition and deals, not with winemaking, but with the constituents of wine. The authors are well known for their work on the chemistry of wine, and have provided an excellent review of recent studies made in France and, to a lesser degree, in other countries. On every topic considered, the modern view is carefully compared with the work of the older oenologists. The most important recent researches concern the "balance" of organic acids; the pH values of wines; the ionic equilibrium; the oxidation-reduction potential and its relation to aging; the role of heavy metals; the esterification of fixed and volatile acids; the colouring matters and the vitamins. The text was originally prepared in 1939 but was revised in April, 1946.

The French chemists naturally pay more attention to the dry wines of their own country than to the sweet, strongly alcoholic wines of other countries, hence Empire winemakers will not find some of the discussion directly applicable to the wines they are accustomed to make. However, the recent developments are most interesting, and all oenologists will wish to study closely the French work on esterification and oxidation-reduction potentials, which, according to the authors, will eventually result in a greater understanding of the changes occurring during aging.

There is a short discussion of the part played by yeasts during fermentation and a plea for more physiological studies of yeasts. They do not mention the film-forming yeasts used in the maturation of Spanish sherries. A summary of the classic discoveries of Müller-Thurgau and Osterwalder on bacterial decompositions in wine is given. Some interesting and controversial material is presented in the chapter on the nutritive value of wines. The authors seem to be too anxious to make out a case for the minute amounts of vitamins in wine. In comparison with many fruits, grapes contain very little ascorbic acid, and in view of the generally admitted errors in determination of this vitamin it seems unlikely that a reported amount of a few milligrams per litre in wine can play any part in human nutrition.

The list of references is extensive, but it is regretted that some authors are mentioned in the text without any details of their published papers being included in the bibliography.

F.H.H.

1827. GOODALL, D. W., AND GREGORY, F. G. 581.192: 631.8
Chemical composition of plants as an index of their nutritional status.
Tech. Commun. imp. Bur. Horticulture **17**, 1947, pp. 163, bibl. 936, 9s.

Optimum nutrition is of paramount importance to plant yield. Yet the determination of the nutritional requirements of any plant is one of the hardest problems of agriculture and horticulture. Does its solution lie in soil analysis, plant analysis, injection methods or a combination of these and other methods?

The authors of T.C. 17 sift and discuss the enormous written evidence on different methods and technique and thereby do much to clear the ground for future work in this field.

1828. HADFIELD, M. 016: 634/635
Garden books for the amateur.
National Book League, 7 Albemarle Street, London, W.1, 1947, pp. 21, 11d. post free.

Though its avowed purpose is to help the amateur gardener, this publication will be of use to a much wider public. A useful feature is information whether a particular book is out of print or reprinting. All phases of gardening are catered for.

1829. VAN HALL, C. J. J., AND VAN DE KOPPEL, C. 63(92)
De landbouw in den Indischen archipel, Deel 1, *Algemeen gedeelte.* **(Agriculture in the East Indies. Vol. 1, General section.)**
W. van Hoeve, 's-Gravenhage, 1946, pp. 1-423, illustrated, bibl. 129, f. 17.50.

This volume, the first of three, contains the work of ten experts. The longest section—over a hundred pages—deals with general aspects of crop husbandry, such as clearing, soil conservation, green manuring, selection, propagation, breeding and field experiments, with a bias on plantation methods. Some idea of the wealth of detail included is given by the section on the treatment of seeds that do not germinate readily; *Selaginella* sp., usually regarded as a worthless weed, is mentioned as a useful material for packing budwood. There is an interesting summary, with diagrams, of Professor Wellensiek's breeding methods for the various groups into which crop plants fall naturally, e.g. the oil palm and coconut palm agree in fruiting repeatedly and in relying on seed for reproduction, and so fall into the same breeding scheme. In the account of selective weeding, "good" and "bad" weeds are named, and some are figured; methods of eradicating *Imperata cylindrica* are given. Other sections cover soils, climate, irrigation, the economics of native farming, agricultural legislation, labour (both native and European), animal husbandry (rather briefly), and statistics of production and export, on estates and native farms, by districts and islands. Future volumes are to be devoted to the various crops, and they should prove of great interest to the specialist.

One or two minor typographical slips might with advantage be removed in any future edition. Thus *Ageratum mexicanum* Sims. is figured in fig. 186b, but the text p. 184 refers [correctly] to *A. conyzoides*. Again the legend of fig. 186p should be *Synedrella nodiflora*, not *nudiflora*, etc. These are, however, unimportant and do not appreciably detract from the great value of the work.

1830. VAN HALL, C. J. J. 63(92)
Insulinde de inheemsche landbouw. **(Native agriculture in the East Indies.)**
W. van Hoeve, Deventer, 1946, pp. 220, illustrated, f. 5.90.

This book gives a sympathetic description of the native farmer, his surroundings, the crops he grows, and the efforts of the Government on his behalf; it is well illustrated. In addition to annual field crops, the author describes the cultivation and processing of tobacco, potatoes, vegetables, coffee, rubber, coconuts, pepper (*Piper nigrum* and *P. betle*), tea, kapok, gambier, areca nuts, nutmeg, cinnamon, cloves, sago-palm, benzoin (*Styrax benzoin*), citronella grass and lemon grass, vetiver grass, patchouli, cananga, and many tropical and sub-tropical fruits.

1831. HAYES, W. B. 634.1/8(54)
Fruit growing in India.
Kitabistan, Allahabad, 1945, pp. 283, bibl. 512, illustrated, 15 rupees.

This manual on fruit growing in the tropics will be eagerly sought after and read with profit for many years to come by students and practising horticulturists in the tropics.

The author in a modest preface infers that he was driven to write it originally in the form of lecture notes owing to the lack of any suitable work on which to base his teaching and practice as Horticulturist to the Allahabad Agricultural Institute. These notes revised and admirably polished now form a coherent whole. The author has certainly used to excellent effect authoritative horticultural literature from every part of the world, and his list of references will be of immense use to all who wish to study particular problems more closely. His choice of modern horticultural literature [on p. 98] is also much to our liking!

The book is in two parts. In the first, general principles are considered, but always with an eye to practical application. One very interesting chapter concerns orchard soil management, another protection from heat and cold. The different causes of failure to fruit and possible remedies are discussed. The problems of marketing for the Indian producer are great and a guarded plea is made for co-operative marketing, though the author thinks that the principle of co-operation will probably first have to be applied to the production side of the business. A chapter on hygiene in the orchard is in general terms and does not cover the new spray materials which have only recently been evolved. Part I ends with a plea for greater attention to the processing of fruit by canning, juice extraction, etc., and by a brief account of the history and literature of pomology.

In Part II we get thoroughly practical accounts, based on the latest research, of the cultivation of the following fruits: mango, the citrus fruits, banana, guava and relatives, papaw, litchi, date palm, grapevine, fig, custard apples, pineapple. Shorter accounts are given of pomegranate, jujube, sapodilla, loquat, jackfruit, carambola, phalsa, *Phyllanthus* spp., mulberry, kaki, bael, wood apple, *Flacourtia* spp., various *Carissa* spp. and the olive.

Finally, a most useful account is given of a subject on which we are all too frequently asked for advice in vain, namely the cultivation in the cooler districts of the tropics [in this case of India] of temperate fruits. The apple receives most attention but other fruits and their pests and troubles are also dealt with. We strongly recommend this book to all concerned with fruit growing in the tropics.

1832. HERKLOTS, G. A. C. 635.1/7(512.317)
Vegetable cultivation in Hong Kong.
South China Morning Post Ltd., Hong Kong, Stanley Ed., 1947, pp. 208, illustrated, $12.

The first edition of this useful book appeared in 1941. This second, and much improved, edition was largely written during the author's 43 months of internment in Japanese hands—a remarkable achievement in such circumstances. The book aims at being comprehensive, its first half being devoted for the most part to the theoretical aspects of gardening, the properties of the soil, the essential elements of fertilizers, the food value of vegetables, pests and their control, weeds, hedges, etc., etc. The second, and most valuable, part of the book is of a more practical nature and deals mainly with the cultivation of salads, spinaches, cabbages, onions, beans, peas, gourds, cucumbers, fruits, roots, tubers, and market vegetables. The author's excellent pen and ink illustrations of the various vegetables and fruits dealt with greatly add to the value of the book, and the inclusion of Chinese names will, no doubt, be appreciated by those who can read them. The author, being thorough, is not content with simply telling us how to grow vegetables, but he also tells us how to cook them, rightly pointing out that tropical vegetables require different treatment in cooking from those of temperate climates, " a fact which many housewives do not seem to appreciate ". Although this book was written primarily for Hong Kong, much of its information is of general application and it can therefore be recommended to gardeners, teachers and agriculturists elsewhere in the tropics. Some of the excellent Chinese vegetables mentioned might well be tried in other countries where they are as yet unknown.

1833. JOHNSON, A. T., AND SMITH, H. A. 58: 41.312.1
Plant names simplified.
Collingridge, London, 1947, pp. 120, 7s. 6d.

This is the third edition of a useful little guide to the pronunciation, derivation and meaning of plant names. Formerly limited to hardy plants, it has now been enlarged to include many indoor temperate and tropical subjects and the new sectional genera into which cacti, mesembryanthemums and sempervivums have in modern times been hustled. Both generic and specific names are explained, and though in certain cases the explanation may give rise to bewildered surmise as to the sanity of those who christened them, in others the reasons are alluring. For instance, to learn that *Chorizema* celebrates a joyful dance executed by a thirsty Australian colonist at the sight of *water* irresistibly leads to fruitful search for other gay improbabilities. Again, though the gardening type who, converting *Cheiranthus* to a more euphonious " Cherryanthus ", sticks to it through life may have our sympathy, Clem-*a*-tis addicts will be allowed no further excuse. Let them profit by page 27 or talk of something else. This is distinctly a book to encourage the curious gardener. G.St.C.F.

1834. MANARESI, A. 634.8
Trattato de viticoltura. **(Manual of viticulture.)**
Edizione Agricole, Bologna, seconda edizione, 1947, pp. 624, 248 figs., 2,000 L. it.

Although it has been impossible for the author in recent years to keep in touch with all the foreign work on vine growing, and despite the almost insuperable difficulties which have continued to face Italian research workers since the end of the war, the author has succeeded in bringing out the most comprehensive manual on viticulture which we have seen for a long time and the whole company of vine growers and students should be very grateful.

The work is divided into four parts. In the first the ampelography is very fully dealt with, not only as regards *Vitis vinifera* but also embracing American varieties, direct producers, etc. It ends with a section on clonal selection and its problems.

In the second part the history of vine growing and the origin of present species are considered. Ecology and climatic requirements are discussed at some length.

The third part concerns viticulture proper and all its normal operations.

Lastly in part IV the author deals in some detail with special methods of cultivation, e.g. growing the vine on living supports, pruning and training in special ways to facilitate frost protection, etc.

A useful list of synonyms is included and a table of contents concludes the work.

The author hopes that it may be possible to publish a third revised edition in the near future. If this is so, as indeed we also hope, may we utter a plea for the inclusion of a bibliography ? The author has obviously studied every relevant authority available on every phase of the subject, and he quotes them in the text with the date of publication, but we cannot agree with him that this should be sufficient to enable the student to trace the original article without much trouble. We realize that the bibliography would be enormous, but it would also be invaluable and we strongly urge that it shall be included in any future edition or made available separately, say as a supplement to the third edition. To have such a bibliography available would be extraordinarily useful to viticultural workers throughout the world.

1835. MINISTRY OF AGRICULTURE, LONDON. 63(42)
National farm survey of England and Wales (1941-1943). A summary report.
H.M. Stationery Office, London, 1946, pp. 109, 2s.

In this survey, holdings of the size of 1-5 acres, numbering some 70,000 and comprising less than 1% of the area under crops and grass, have been disregarded, since they were to be included in a survey of horticultural holdings. But, as must be expected in an almost exclusively agricultural publication, there are only a few references to horticulture. In Appendix II, market gardening, including fruit and hop growing, is briefly dealt with as Type P. The areas where market gardens are of particular importance are named; there they cover well over 25% of the total farm land. Most of the land is fertile but not as uniformly so as the Fens. Table 3 indicates that the 5,200 market gardens in England and Wales occupy 300,000 acres, with an average size of 69 acres, and that they constitute 1·8% of the farms and

1·5% of the farming area. Table G is interesting in that it shows market gardens to employ by far the highest number of whole time regular workers per 100 acres, viz. 5·6. The distribution of crops in market gardens is as follows: Cereals and pulses, 26·9%; potatoes and sugar beet, 8·1%; fodder crops, 5·1%; hops and orchards, 14·2%; small fruit and vegetables, 12·3%; permanent grass, 28·7%; temporary grass and fallow, 4·7%. According to Table H, the size distribution of market gardens is: 5-25 acres, 53·9%; 25-100 acres, 25·0%; 100-300 acres, 15·9%; 300-700 acres, 4·6%; 700 acres and over, 0·6%.

1836. Osvald, H., and others. 632.5: 632.954
Försök rörande kampen mot ogräset, 1935-46 **(Weed control experiments [in Sweden], 1935-46.)** [English summaries.]
Almquist & Wiksells Boktryckeri AB, Uppsala, 1947, pp. 318, bibls., Kr. 25.

This volume, a publication from the Institute of Plant Husbandry (Crop Production) of the Royal Agricultural College of Sweden, contains 10 papers dealing with experiments on weed control by sodium chlorate, calcium cyanamide, sulphuric acid, copper salts, DNOC, and growth substances. Each paper concludes with an English summary. Though in most cases the weed problem was studied from an agricultural point of view, horticultural scientists might be glad to have the book brought to their notice. There is e.g. a review of the literature on weed control by hormones, accompanied by a comprehensive bibliography, and a discussion of experiments on the application of growth substances to the soil prior to sowing cereals. Of particular interest, perhaps, is a report by Osvald on experiments with couch grass extracts. It had been observed that rape, *Brassica napus* f. *oleifera* and *B. rapa* f. *oleifera*, developed very poorly in patches occupied by couch grass, *Agropyrum repens*. Water or (better) ammonia extracts of ground couch grass roots and stolons were therefore made and their effect on oat and rape germination was studied. It was found that low concentrations of the extract stimulate germination, somewhat higher concentrations retard it and high concentrations inhibit it. The inhibition of oats requires double the concentration needed to inhibit rape. This behaviour, together with the response of *Mucor* and *Penicillium* to the extract, suggest that the toxic substance is of the growth hormone type, and that the great competitive ability of couch grass is partly due to an excretion of its roots. One implication of this hypothesis is that plants resistant to treatment by growth substances might be assumed to produce growth substances themselves. In a final paper on weed control at present and in the future, legislation against the use of impure seed is demanded.

1837. Phillips, G. A. R. 635.967.2
The rock garden and alpine plants.
Collingridge, London, 1947, pp. 251, 15s.

Writers of books on rock gardening are unfortunate in that their productions must inevitably suffer comparison with that bible of the craft, Reginald Farrer's "The English rock garden" (1919). But Farrer is out of print and, further, has no mention of the many new introductions which have since crowded into the catalogues, for instance *Rhodohypoxis*, to-day almost monotonously massed on every Chelsea Alpine table. However, with Mr. Phillips' book on hand, rock gardeners, particularly beginners, will have practically all they need. It is true that comparatively few varieties are described in much detail but a great many are listed under appropriate heads, with note of colour and height, for various sites and seasons, a more than adequate substitute for the customary paean of praise. The opening chapters are devoted to a discussion of methods of constructing a rock garden with its attendant pools and paving. While not over-elaborated, a sufficient number of "do's and don'ts" are provided to enable the learner with imagination to use it with some chance of making good. Part 2 is divided into chapters dealing respectively with plants for early, mid- and late season display. Part 3 is concerned with ferns, shrubs and bulbs which, though not strictly of mountain origin, make good companions for the alpines proper. Part 4 deals with glasshouse and frames. The final chapter is on propagation. An unusual feature and one of some interest is the inclusion of a chapter on hardy orchids. These plants are generally ignored, presumably on account of their supposed difficulty. Here Mr. Phillips optimistically lists sixty and provides notes on position and compost. It is a fact, though not stated here, that practically every native British orchid has been successfully grown in gardens at one time or another, and these notes may encourage someone again to take up the cult. The book is well illustrated. G.St.C.F.

1838. Remington, J. S. 631.8
The manure note book.
Leonard Hill, London, 3rd edition, 1946, pp. 74 4s. 6d.

What we find so trying when we consult the professors is that one professor says one thing and one another, but both inevitably start by saying "it all depends". Well, this book does not. It takes a vegetable or fruit, plants it under certain prescribed conditions and manures it accordingly. For a notebook, such as this, the method is entirely suitable. Admittedly it presupposes a modicum of horse sense in the mind of the reader. Still, we all think we possess that commodity and so should happily buy this small mine of fascinating information on comparative consistency of manures and fertilizers of all kinds, on the making up of manures, on conversion of English weights into metric weights and on many other points. Compost is among the organic substances considered.

1839. Skovgaard, K., and Pedersen, A. 633/635(489)
Survey of Danish agriculture with a supplement on Danish horticulture.
National Danish F.A.O. Committee, Copenhagen, 1946, pp. 169.

We are here chiefly concerned with Professor Pedersen's appendix (pp. 153-69), which gives a short summary of the different branches of horticulture. Despite her northerly position and although she lacks naturally fertile garden soil, Denmark is not unfavourably situated for the cultivation of horticultural crops. In fact, she is well on the way to becoming a horticultural country. Incidentally, one is surprised to read that even in this stock farming country *par excellence* market gardeners find it difficult to obtain manure and that, as elsewhere, they are reduced to supplying the organic needs of their soil with composts and green manuring. *Fruit growing* (see also *H.A.*, 17: 1162). According to the census of 1945, out of a total number of about 10·2 million fruit trees about 7·3 million are apple trees. Plum and cherry trees are not far from the million mark, while there are only 172,000 pear trees. Gooseberry and currant bushes total 7·6 million and filberts nearly half a million. Raspberries are grown on an area of 655 hectares. Two-thirds of the fruit trees are grown on the islands where conditions are much more favourable than on the mainland. Commercial orchards, varying in size between 0·5 and 5·0 hectares, represent a recent phase of development; they cover about 11,000 hectares, excluding about 1,200 hectares of bush fruit. The most important apple varieties grown for sale in 1940 were Cox's Orange (22·4%) and Gravenstein (8·4%); in fresh plantings since 1933 Cox's Orange holds the first place with 84%. Apple production in 1945 amounted to about 100,000 tons, and large quantities of fruit, especially apple, will be exported in future. Fruit juice and fruit wine production as well as jam manufacture play an important part in fruit utilization. Danish nurseries supply not only the country's requirements, but carry on some export trade, particularly with the other Scandinavian countries. *Vegetable growing*. With the exception of

onions, Denmark is self-supporting in vegetables, and large quantities of cabbage, carrots, celeriac, leeks and beetroot are available for export. Seed is also grown for export, especially that of cabbage and cauliflower, the latter enjoying a world-wide reputation. Vegetable storage is still comparatively primitive. Tomatoes are the chief glasshouse crop and are another agricultural export. The total area under glass is now 413 hectares. *Flower production* has lately increased to such an extent that the country's needs are supplied and a considerable export of roses, carnations and some other plants has become possible. *Plant breeding* is not carried out on an extensive scale, English fruit varieties, for instance, being well suited by the Danish climate. Vegetable seed firms carry out their own improvement work, but new strains and varieties are tested jointly by the State and growers' organizations. For *experiment stations*, see *H.A.*, 16: 1193. Horticultural instruction, the state advisory service, the marketing of garden produce and the activities of horticultural societies are briefly discussed. The book is illustrated with attractive photographs.

1840. STEINHAUS, E. A. 576.895.7
Insect microbiology.
Comstock Publishing Co. Inc., Ithaca, New York, and Constable, London, 1946, pp. 763, bibl. 1,702, $7.75 or 45s.

In the introduction it is pointed out that "In a sense, it is somewhat superfluous to begin this book with a chapter entitled 'Introduction' when in reality the purpose of the entire book is to introduce the field to those it may concern." The book covers a wide range of sciences, since bacteriology, protozoology, mycology, pathology, and immunology are concerned in addition to entomology. In it is a fund of information which was not previously available under one cover and which will prove invaluable to the teacher and student alike.

Its chief concern is with the biologic relationships existing between microbes and insects. Lists are given of the microbes concerned and these will be found in their respective chapters. Chapter II relates to the intracellular bacteria and insects, and III to the specific bacteria associated with insects. Chapter IV treats of the intracellular and bacterium-like and rickettsia-like symbiotes and discusses in a cursory manner the relationship of these micro-organisms to the embryonic development of the insect hosts. The rickettsiae themselves are dealt with in Chapter V. They may be described as bacteriem-liku organisms, living and multiplying in arthropod tissues, behaving as obligate intracellular parasites. Yeasts and insects form the context for Chapter VI, and a fascinating account is given of the role of yeasts in the nutrition of insects. Next, in Chapter VII, come the fungi and insects, and such well-known genera as *Empusa*, *Entomophthora* and *Massospora*. All of them are entomogenous and are referred to briefly. Viruses and insects, in Chapter VIII, are dismissed in thirty-seven pages, which means that the subject is referred to very generally. The virus diseases of plants are mentioned, but the horticulturist will be disappointed at the lack of detail. This aspect has, of course, been covered much more effectively by J. G. Leach (1940) in his work entitled "Insect transmission of plant diseases" [See H.A., 11: 644]. The closing chapters refer to the spirochetes associated with insects; protozoa; immunity in insects; and methods and procedures. The book ends with its formidable list of references and comprehensive author and subject indexes.

A.M.M.

1841. STERN, F. C. 635.936.751
A study of the genus paeonia.
Royal Horticultural Society, London, 1946, imperial quarto, pp. 155, 15 coloured plates and 28 text figures, bibl. 111, £3 3s.

The author of this beautifully-produced monograph, which recalls more spacious, easy times, will earn the gratitude of all lovers of this highly decorative garden flower. At the cost of enquiry and collection started nearly 30 years ago he has assembled a mass of information inaccessible to the ordinary garden lover. In brief, he deals in unhurried, clear fashion with the following: Keys and classification; summary of species and geographical distribution; enumeration of species; history of paeony literature; species in cultivation. In an appendix he sorts out the species and their synonyms.

1842. VENKELER, J. 631.589: 631.544
Rekbak-cultuur. **(Shelf culture.)**
Courrier Horticole, 5 rue de Ciplet, Brussels II, 1947, pp. 47, fr. 21.

This brochure is written by the originator of the method of intensive culture described. From his descriptions and illustrations it would appear that the method is highly successful and of particular interest for those who find their own garden space too restricted for their ability and energy. The method is essentially a multiple window-box arrangement for growing crops in tiers one above the other in the open or in a greenhouse. In a short introduction the author compares the number of plants that can be grown with the same ground space by his method and in the ordinary way—strawberries 3 to 5, lettuces 2, tomatoes 5 times as many. Constructional details and the operation of filling the shelves are described; a method described for supplying water at regular intervals is such that each shelf of soil receives its moisture from below, the upper surface remaining dry, with the result that weeds do not thrive. The structure is 1·5 metres high, and single or double; the shelves, which may be removable, are sloped to retain the soil and are held in place on iron staves let into cement (preferably) supports. The distance between the shelves is 10, 15 or 30 cm. to suit the particular crop for which the staging is required. The method is said to be particularly applicable for growing tomatoes, melons, potatoes, strawberries, lettuces, etc., for bulbous plants, for raising seedlings and for striking cuttings of ornamental plants. Special details are given for growing tomatoes, strawberries (particularly everflowering varieties), celery, melons, cauliflowers, dwarf beans, potatoes, chicory and certain cut flowers.

1843. WHITEHEAD, G. E. 635.9
Gardening for pleasure.
A. & C. Black, London, 1947, pp. 285, 10s. 6d.

In the war years Mr. Whitehead supported the nation's victory dig by producing a number of excellent small treatises on the growing of fruits, vegetables and other edible garden produce and backed them up by an able little *multum in parvo* called "Soil sense". In the present volume, containing many more pages than its specialized predecessors, he says goodbye to all that and embarks on "Gardening for pleasure". This time it is the eye that gets the pleasure. The heading of the opening chapter, "Hints on planning", strikes an ominous note, but it turns out to be not that kind of planning. Mr. Whitehead happens to understand what he is talking about. The various sections into which flower gardening is commonly classified are accorded each a separate chapter: bedding, herbaceous, roses, rock, water and others, while the use of greenhouse and cold frame is not forgotten. Those who cannot manage their lawns should read chapter twelve and try again. A book by Mr. Whitehead is sure to hold a shrewd reflection or two, illuminating mysteries hitherto obscure. For instance it had not hitherto occurred to us that a plant that remains expensive is almost certainly one that is difficult to grow and had better be avoided. Gardeners accepting this advice will have money to spare for the many decorative and reasonably-priced plants so freely described in this book. Though tolerant in most matters to the point of connivance, we cannot admit that the singular of species is specie as seems to be inferred here throughout.

This whimsy apart, it can confidently be said that if a constructive all-round book on present-day garden management and design is needed, then here it is. G.St.C.F.

1844. WOOLMAN, J. 635.939.98
Chrysanthemum culture.
Woolman's, Shirley, Birmingham, 1947, 6th edition, pp. 56, 3s. 6d.

The author of this little book is a well-known grower of chrysanthemums who has raised and introduced many varieties of merit, including that charming strain of miniatures known as Lilliput. Here in a sixth and revised edition he tells how he does it and many other things besides. The culture is dealt with from the amateur's point of view, that is, the production of more or less specimen plants, and hence is confined almost exclusively to pot culture, whereby each plant can receive individual attention. There are some useful pages on pests and diseases. Mr. Woolman, like Mr. Genders (see this issue, Abstr. 1825), describes how he secures and propagates worth-while sports that may appear on his plants, but his method differs in that he prefers to layer the sporting branch after ringing each leaf joint from which it is hoped that shoots for propagating will eventually arise. Some excellent colour plates of new varieties of the author's raising are provided, none of them, except the Lilliputs, earlier than 1945. G.St.C.F.

1845. BERMUDA. 633.491-2.96
Report of Plant Pathologist, Department of Agriculture, 1946, pp.18.

Biological control of potato tuber moth. An attempt was made to introduce *Copidosoma koehleri*, an egg parasite of the potato tuber moth, *Gnorimoschema operculella.* Over 38,000 parasitized larvae were received by air from California. *Minor investigations.* The results of trials with fungicides, insecticides, a herbicide and a successful new rodenticide are given. *Fungi, insects and diseases.* A list is given of these recorded on various crop plants, trees and ornamentals.

1846. BRITISH COLUMBIA. 63(71.1)
Forty-first Annual Report of the Department of Agriculture, B.C., 1946, 1947, pp. 198.

Reports of particular interest to the horticulturist are those of the following: *Horticultural Branch*, pp. 59-84 (W. H. Robertson, Provincial Horticulturist). A seven-page extract from a full report on the seed work in the Province indicates that the peak of production of vegetable seeds has been passed, although the production of flower seed and field crop seed has continued to increase in volume and total value. Attention should now be directed to a careful watch on the markets and the possibility of lowering costs of production while maintaining an improved quality of product. In the Salmon Arm-Sorrento area Fermate ½ lb. and Sulforon 4 lb. to 100 gal. water gave as good or better control of apple scab than lime sulphur, and increased vigour owing to decreased foliage injury. Moreover, it is more easily applied and costs only slightly more; it is therefore recommended. Notes are given of results of trials of the following: deblossoming sprays, buffalo tree hopper control, pear thrips control, mite control, codling moth control, new sprays, apple powdery mildew control, mealybug control, coryneum blight control, strawberry red stele disease, little cherry virus, orchard equipment, soil management. Little cherry virus disease is spreading rapidly and has become very serious, especially in the Kootenay. It is hoped to prevent it spreading into the Okanagan. Red stele is the most serious strawberry disease in the Province. Trials indicate that some measure of control can be expected by good drainage and improved cultural methods, but breeding and selection of resistant varieties is essential and is actually in progress.

Plant Pathologist, pp. 92-100 (J. W. Eastham). Notes are given on a number of weeds and plants poisonous to stock, little cherry, red stele of strawberry, late blight of potato, verticillium wilt in tomato, bacterial ring rot of potato. *Provincial Entomologist*, pp. 100-110 (I. J. Ward). Among pests, the incidence or control of which is noted here, are Colorado beetle, flea beetles, onion maggot (*Hylemyia antiqua*), onion thrips, cabbage fly and moth, various greenhouse pests. In the hop yards a dust containing hexaethyl tetraphosphate, being very volatile, was highly successful against aphids.

1847. HORTICULTURAL EDUCATION ASSOCIATION. 634/635
Occasional Publication No. 5, March, 1947, pp. 96, Gibbs & Sons, 16 Orange Street, Canterbury, 4s. 3d. post free.

This brings to an end the series of Occasional Papers published by the Horticultural Education Association as a wartime measure. It contains short useful surveys by the leading English authorities of subjects which have been much in the minds of British horticulturists in recent years. Four papers concern mineral deficiency problems and methods of investigation. Advances in the use of growth substances are noted in a fifth. A paper on field ploughing is followed by one on recent advances in horticultural machinery of different kinds and a third on spraying machinery. The position with regard to bacterial canker and leaf spot of plum and cherry is set out and other more general articles concern control of vegetable diseases, DDT and other insecticides, and pests of brassica seedlings. Most of the articles give a clear outline of their subject and provide references to original articles for those who want to study the matter further.

1848. INSTITUTE OF CORN AND AGRICULTURAL MERCHANTS LTD. 63
Journal of the Institute of Corn and Agricultural Merchants Ltd.
Vol. 1, No. 1, April, 1947, pp. 40, 5, Copthall Chambers, London, E.C.2, 5s.

Except as touching potatoes, this new journal would not appear to deal with matters of immediate interest to horticulturists.

1849. JAMAICA. 633/634(72.92)
Annual Report, Department of Agriculture, Jamaica, 1945-6, 1947, pp. 16.

Bananas. A condensed account is given of the breeding work in progress and the design now adapted for variety trials is described. In cold storage trials with Gros Michel, S.A1 and Lacatan, the last named, though of good flavour, proved inferior in skin-colour and flesh-texture and also more susceptible to chilling than Gros Michel *Citrus.* An outline of results from fertilizer trials is given. Examination of data from these trials showed that the composition of the mature leaves is very susceptible to fertilizer treatment and that foliar analysis can be a great diagnostic help when coupled with soil analysis. Some results from leaf analyses are quoted and conclusions drawn. *Coconuts.* Reference is made to the "Unknown Disease" formerly referred to in reports as Bronze Leaf Wilt. *Coffee.* A quality survey was carried out by districts. *Orchard crops.* Brief notes are given of the work done on avocados, mangoes, guavas, naseberries (*Achras sapota*), mulberries, pimento and cashew nuts.

1850. NYASALAND PROTECTORATE. 63(689.7)
Report of the Department of Agriculture for 1945, Part I, 1947, pp. 18, 2s. 6d., and Part II, Experimental work, 1947, pp. 13.

Part I. Noted.

Part II. Experimental work:

Tea: A concise account is given of the experimental work, mainly at Mlanja Tea Station. Down-pruning old tea: results from first season show that 18-in. tipping did not reduce yield as is commonly contended. Treatment of young tea: this investigation continues to show that young tea responds to hard treatment, at least in the early stages

of its growth. Spacing experiments; $3\frac{1}{2} \times 3\frac{1}{2}$ ft. to 5×5 ft.: results continue to indicate that the closer the spacing the higher the yield of tea. Pruning experiments: it is concluded, as in the past, that whenever climatic conditions allow, Indian Jat tea should not be pruned yearly. Time of application of fertilizer: a consistently higher yield is obtained when half the fertilizer is applied before the rains and half in March before pruning. Cultivation experiment: results not significant but there are indications that, contrary to popular belief, the yield from a " dirty " field may not be drastically reduced as a result of its weed-growth. *Tung :* Work of Tung Experimental Station mainly concerned with production of improved plant material of *Aleurites montana*. Selection of mother trees: the yields of some of these are notable; e.g. ZM 13, aged 13 years, gave 117 lb. dry seed and ZC 2A, at 9 years, 106 lb. Vegetative propagation: buddings on *montana* stocks have significantly outyielded all other treatments while buddings of *fordii* were better than unselected, but not so good as selected seedlings. Differences in vegetative vigour are now apparent, the seedling trees being distinctly bigger than budded trees while the dwarfing effect of *fordii* stock is also evident. Cultural and manurial experiments: in an intercropping trial soya bean plots have been consistently better in the first four seasons than the other three treatments: maize, velvet bean and *Calapogonium*.

1851. PENINSULA HORTICULTURAL SOCIETY. 633/635(751)
Transactions of the Peninsula Horticultural Society, 1945, being *Bull. St. Bd Agric., Delaware*, Vol. 35, No. 5, pp. 70.

This bulletin contains records of papers and/or discussions on the following subjects, amongst others: strawberry varieties; the place of new sprays and dusts in the control of insects and diseases; recent experimental results with DDT on control of codling moth; new developments in fungicides; new vegetable varieties for the future, etc.

1852. PENNSYLVANIA STATE HORTICULTURAL ASSOCIATION. 634/635(74.8)
Proceedings of the 88th Annual Meeting of the Pennsylvania State Horticultural Association, 1947, in *St. hort. Ass. Pa News*, 1947, **24**: 1: 1-120.

Among articles of research interest are those by P. J. Chapman entitled " Dormant and semi-dormant sprays with special reference to the control of mites " (pp. 73-82) and by F. H. Lewis, " Notes on two virus diseases of sour cherries " (pp. 65-72, yellows and ringspot—also published as *Bull. Pa St. Coll.* 155).

1853. PUERTO RICO. 633/635(729.5)
Informe anual del comisionado de Agricultura y Comercio, 1943-44. (**Annual report of the Department of Agriculture and Commerce, Puerto Rico, 1943-44.**)
San Juan, 1945, 205 pp., and *ditto for 1944-45*, 1946, pp. 216.

The general report on the activities of the Department of Agriculture during the fiscal year 1943-44 has a few notes of horticultural interest, e.g. the effect of the drought on crops (including coffee, citrus, and tobacco), pp. 20-22; the yields from various crops (coffee, tobacco, coconut, vanilla, pineapple, citrus), pp. 22-30.
The report for 1944-45 is on similar lines. The only notes of horticultural interest concern yields of tobacco, coffee, coconut and pineapple, pp. 8-10.

1854. THE ROYAL SOCIETY. 63
Preliminary Report. The Royal Society Empire Conference, London, June-July 1946, 1947, pp. 67.

Includes discussion on: A survey of some outstanding problems in agricultural science in the Empire; Scientific Information Services; Collection of scientific records and material and risks involved in the distribution of plants, seeds and animals; Land utilization and soil conservation Post-war needs of fundamental research.

1855. SIERRA LEONE. 63(66.4)
Annual Report of the Department of Agriculture, Sierra Leone, for the year 1945, 1947, pp. 24, 1s. 6d.

The recording of yields of individual citrus, coffee and oil-palms (Deli, Angola and Nigerian) continued. The Angola oil-palm showed most promise and a pure-line multiplication plot from the best tree is now coming into bearing. *Ginger:* steps were taken to improve quality of export ginger. *Piassava:* efforts are being made to improve quality by giving instructions on correct methods of processing. *Black pepper* (*Piper nigrum*)*:* analysis showed that composition of some locally grown samples differed from accepted United Kingdom standards. *Onions:* the only type normally grown is a native shallot. Onion seed introduced from Nigeria gave good yields but failed to set seed. *Citrus:* the scale pests *Lepidosaphes beckii* and *Prontaspis citri* can be effectively checked by spraying with Sulfinette (lime-sulphur), strength 1 : 40. Citrus moth: *Achaea* species predominated in 141 night collections, totalling over 9,000 moths. New food plants of adults and larvae are recorded. Few parasites were found.

1856. TRINIDAD AND TOBAGO. 63(729)
Administration Report Director of Agriculture, Trinidad and Tobago, 1945, 1946, pp. 20, 60 c.

Cocoa: Witchbroom disease was so heavy in some areas as to make it uneconomic to open up abandoned cocoa estates. Low yields resulting from disease and neglect have led to abandonment or semi-abandonment of many cocoa properties. Standard of finished product in 1945 was below normal. Some 90,000 high-yielding clones were distributed under Cocoa Rehabilitation Scheme. Of clones introduced from Amazon Valley 2 have shown no witchbroom while 8 have had a single infection during 2 years' observation. *Citrus:* the lime crop continues to decrease on account of " root disease " for which no causative organism has been found. Over 200,000 sour orange seedlings were established at St. Augustine as stocks, the aim being to bud 100,000 in 1946 and 75,000 annually thereafter.
Avocado: Pollock remains the most popular variety but late-fruiting West Indian-Guatemalan hybrids are now being propagated to extend fruiting season.
Tonca bean: treated as a forest tree with little or no cultivation, the large number of older trees in the poorer soils now give small crops.
The report of the Plant Pathologist deals with witchbroom, pink disease (*Corticium salmonicolor*) and virus disease of cocoa; mosaic disease of papaw and bacterial wilt of tomato.
The Entomologist reports on control measures for *Diaphania hyalinata* and *D. nitidales* on cucumbers and *Hellula phidilealis* on cabbages and cauliflowers.

1857. TRINIDAD, IMPERIAL COLLEGE OF TROPICAL AGRICULTURE. 633/635(729)
Report of the Governing Body and Acting Principal's Report for 1946, St. Augustine, Trinidad and Grand Buildings, Trafalgar Square, London, W.C.2, 1947, pp. 31.

Brief reports from the heads of scientific departments outline the work done and some of the results achieved. *Botany.* An indication is given of the future trend of banana research and the urgent need for a collecting expedition to the Far East is mentioned. An interesting advance is the building up by a species cross of an edible banana. *Entomology.* Observations continued on various vegetable pests, especially those attacking tomato, egg plant, cabbage and cauliflower. *Mycology.* All types of witches' broom pod infection seen in the field can be produced artificially by inoculation of young fruits of appropriate sizes.
The report concludes with a list of papers published by the College in 1946.

1858. UNION OF SOUTH AFRICA. 634/635(68)
Report of the Department of Agriculture, Union of S. Africa, for year ended 31 August, 1945.
Fmg S. Afr., 1946, **21**: 131-204.

This article is the report of the Department of Agriculture of the Union of S. Africa for 1944/45. In sections III (The most important food products) and IV (Other agricultural products), production figures and price developments during the report year are discussed for the following crops and products of horticultural interest: Vegetables, groundnuts, citrus fruit, deciduous fruit, dried fruit, wine and brandy, tobacco, chicory. In section VII (Control of agricultural pests and stock diseases) problems are described which came prominently to the fore in 1944/45, including the following: (1) Codling moth. Experiments on the control of this pest on apple continue at Elgin and at the Western Province Fruit Research Station. The measure of control achieved with fixed nicotine, lead arsenate and summer oil emulsion was equally satisfactory with all the chemicals. The results showed again that in the high veldt area 3 sprayings at intervals of about 10 days must be applied during January in order to control the second generation. On apricots, as two years' experiments proved, codling moth infestations can be kept below 5%, without injury to the trees, by 2-3 applications of fixed nicotine, carried out about 15 October and further at intervals of 10 days. In the case of one parasite the problem of mass breeding has been solved satisfactorily. (2) The vine mealy bug became troublesome early in summer, despite the ant control applied, because the cool moist season favoured the breeding of the pest and was detrimental to its predators. After January the conditions were reversed and the mealy bug was under control by the end of the grape season. (3) Bacterial blight. This severe vine disease, which spreads at an alarming rate with devastating results to susceptible varieties, has now been observed on two vineyards of the Hex River Valley. Long-term experiments are in progress. (4) Kromnek disease. The finding of the previous year was confirmed that double planting—with subsequent thinning, if necessary—is effective in the control of the disease.

1859. UNION OF SOUTH AFRICA. 63(68)
Report of the Department of Agriculture, Union of S. Africa, for year ended 31 August, 1946.
Fmg S. Afr., 1947, **22**: 74-360.

A comprehensive report of 286 pp., divided into 17 sections, including brief research reports from the officers in charge of the following divisions: horticulture; botany and plant pathology; fruit research; low temperature research; dehydration and cold storage. [Abstracts from these reports appear under their appropriate headings in the present number.]

1860. VERMONT STATE HORTICULTURAL SOCIETY. 634.1/2(743)
Proceedings of the 50th Annual Meeting of the Vermont State Horticultural Society, pp. 79.

The papers are mainly surveys of the progress made and the position now reached in certain fields of pomological investigation. These surveys, which are by experts and give a balanced summary, are perhaps of greater value to the general public than to the investigator who wants to study original work. But as general summaries they can be strongly recommended despite their brevity. Among subjects considered are the following: The pros and cons of clonal rootstocks for apples (J. K. Shaw of Amherst, Mass.), The magic of plant growth regulators (J. K. Shaw), Apple cold storage practices (J. W. Southwic of Cornell), Preventing mineral deficiencies in apple trees (A. B. Burrell of Cornell), Recent trends in spray materials and spraying and dusting equipment for pest control (E. J. Rasmusson of East Lansing), Orchard fertility [i.e. soil management, fertilizer, tree builders, etc.], (M. B. Davis of Ottawa).

1861.

The following also have been examined:

a JONES, W. N. 575.255 + 575.257
Quimeras vegetales e hibridos de injerto. **(Plant chimaeras and graft hybrids.)**
Monografias sobre temas biologicos, **2.**
Acme Agency, Soc. de Resp. Ltda., B. Aires, 1946, pp. 157.
A translation of the first English edition published in London 1934 and 1935.

b WHITEHEAD, T., MCINTOSH, T. P., AND FINDLAY, W. M. 633.491
The potato in health and disease.
Oliver & Boyd, Edinburgh, 2nd edition, 1945, pp. 400, 25s.
The most modern textbook. For review, see Plant Breeding Abstracts, 1946, Vol. 16, p. 252.

c *A.R. Basutoland Dep. Agric. 1945-46*, Maseru, pp. 28.

d *Rep. Dep. Agric., Bermuda for 1946*, pp. 14.

e *A.R. British Honduras Dep. Agric. 1945*, pp. 8.

f *A.R. Dep. Agric. Leeward Islands, 1945*, 1946, pp. 21.

g *Fifty-first A.R. Minn. agric. Exp. Stat. 1943-44*, pp. 32.
Lists of staff and publications.

h *A.R. West of Scotland agric. Coll. 1944-45* [received 1947], pp. 86.